the OIL AND GAS JOURNAL

Our interests are the same

...getting your well down in shortest possible time!

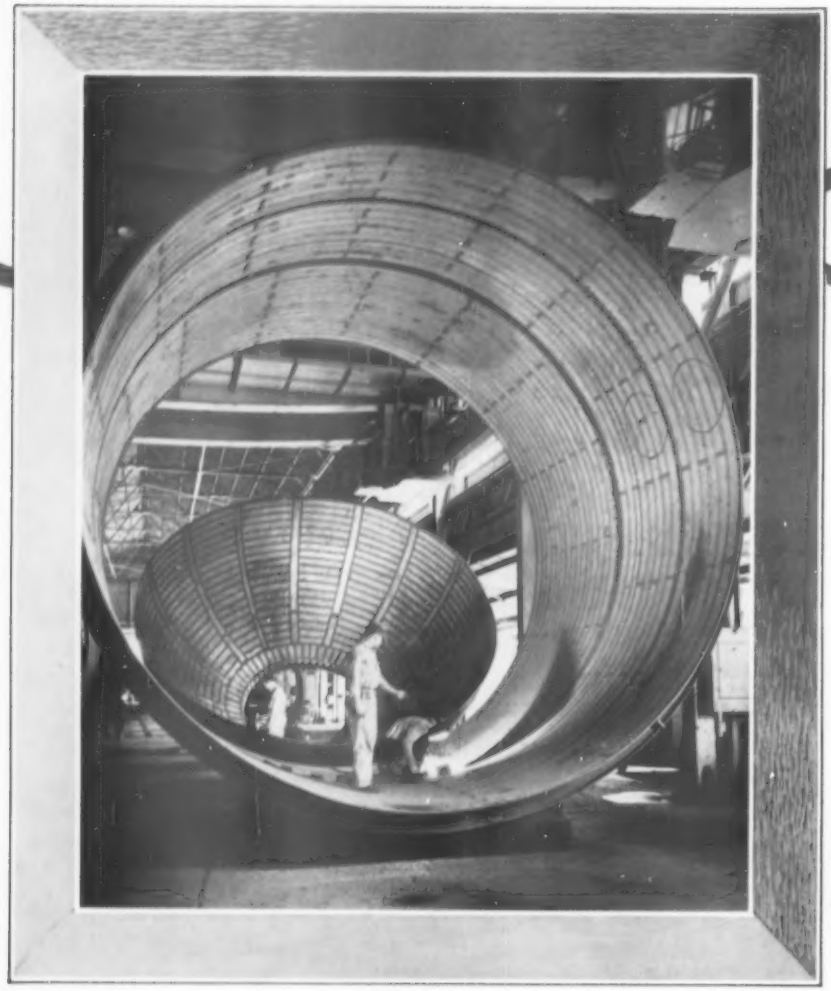
HUGHES research and the combined efforts of the HUGHES field organization* have *one purpose*... giving you bits that will get your well down in the least possible time... and at the least possible cost.

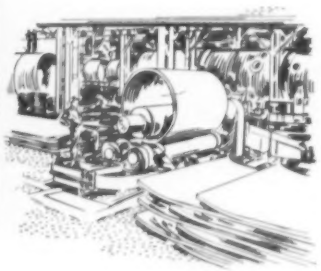
The HUGHES man responsible for servicing your rig knows from actual field experience the bits that will give you the fastest penetration and most footage in the formations you are likely to encounter. And you can depend on him to have the right bits on your rig at the right time.

* *A field organization of over 400 serves the industry in the United States and Canada*

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 **AUGUST 9, 1954**

Pride in the Job





It is the attitude of the workman that assures excellence. When he will give only his best, the product is the best.

This attitude has prevailed in Wyatt's Shops since the first job was completed in that little building on Coombs Street in Dallas, back in 1913.

It is something beyond design and specifications and something of which Wyatt Metal & Boiler Works is proud.

MANUFACTURERS AND ERECTORS SINCE 1913

the OIL AND GAS JOURNAL

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In Brief . . .

1. MIRACLE MILE . . . Shell Oil has operated for about a year a high-capacity meter-proving system which is a radical departure from previously established methods. Consecutive flow tests usually check within 0.05 per cent.

2. ETHYLENE BOOMS . . . Ethylene demand rose from 1.5 billion pounds in 1950 to 2.1 billion pounds in 1953 and is expected to be 3 billion pounds by 1956. Greatest present uses are for manufacture of ethyl alcohol, ethylene oxide glycol, styrene, and halogenated ethylenes. These are important petrochemical building blocks.

3. MEASURING COKE . . . Coke-level and phase relations in a delayed coking drum can be determined with gamma-ray-emitting Cobalt 60. Maximum coke production can be more nearly approached, and froth levels can be maintained below the drum outlet.

4. BETTER PUMPING . . . Rod pumps give best service when these factors are evaluated: (1) use of proper metals for problem at hand; (2) careful evaluation of sand and gyp conditions, and (3) evaluation of phase relationships in the wells. The pumps can then be selected specifically for the application.

5. INCREASED PRODUCTION . . . Methods have been developed for producing vertical fractures during hydraulic-fracturing operations. These fractures can be extended to include a complete open-hole section. Vertical fracturing is very effective in formations having low vertical permeability in relation to horizontal permeability.

WITH THE

"ZC"

You can mount a Fairbanks-Morse "ZC" engine on your pumping jack the way you want it. Clutch and sheave can be mounted on either side of the engine *without sacrifice in efficiency, smoothness or balance.* With the famous Fairbanks-Morse extra-heavy, large double flywheels, there is always one flywheel between engine and load. You get perfect balance, poised or rolling . . . smoother, more efficient, more economical operation.

There is a type and size "ZC" engine to exactly fit your requirements. See your local supply store or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

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a name worth remembering when you want the best

OIL FIELD EQUIPMENT · PUMPS · SCALES · ELECTRIC MOTORS · GENERATORS · LIGHT PLANTS · DIESEL, DUAL FUEL & GASOLINE ENGINES · MAGNETOS · DIESEL LOCOMOTIVES

New Grease Thickener...

Estersil GT

by Du Pont

A new type of grease thickener—quite different from any previously used in commercial grease production—was recently announced by the Petroleum Chemicals Division of the Du Pont Company.

The new material, an estersil, is a pelletized form of finely divided amorphous silica with a "raincoat" chemically attached to each tiny ultimate particle.

Formerly known as PL-171 FINE SILICA, it is completely synthetic and was specially developed for grease compounding. "Built-in" water resistance and exceptional thermal stability are among its unusual and outstanding properties.

NOW—with Estersil GT you can easily prepare a unique multi-purpose grease with the basic advantages listed below . . .

1. Excellent Thermal Stability—Nonmelting Estersil GT greases show little change in consistency over a wide range of operating temperatures.

2. Excellent Shear Stability—This new thickener enables you to make greases with exceptional shear stability under *both* normal and *high* temperature conditions.

3. Water Resistance—The chemically bonded "raincoat" means greases with unusual resistance to wash out or break down in the presence of water.

4. Superior Oxidation Stability—The need for grease antioxidants is eliminated under most service conditions because of the inertness of Estersil GT.

5. Superior Handling Qualities—Softer, more easily applied greases can be used for high temperature service because of the combined mechanical and thermal stability imparted by Estersil GT. These softer greases, of course, are more readily handled at low temperature than the more conventional types.

6. Ease of Manufacture—The completely synthetic preformed thickening structure allows reproducible grease preparation through a simple milling operation.

Du Pont will be glad to send a representative to discuss the formulation of improved greases with Estersil GT. A grease pilot plant is available to assist in this work. Samples of Estersil GT may be obtained by addressing your inquiry to Wilmington, Delaware.

DU PONT
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. . . through Chemistry

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HOUSTON, TEXAS—705 Bank of Commerce Bldg. . . . . Phone PRestan 2857
LOS ANGELES, CALIF.—612 So. Flower St. . . . . Phone MAdison 5-1691

IN CANADA: Du Pont Company of Canada Limited—Toronto, Ont.—Montreal, Que.—Calgary, Alta.
OTHER COUNTRIES: Petroleum Chemicals Export—Nemours Building 6539—Wilmington 98, Del.

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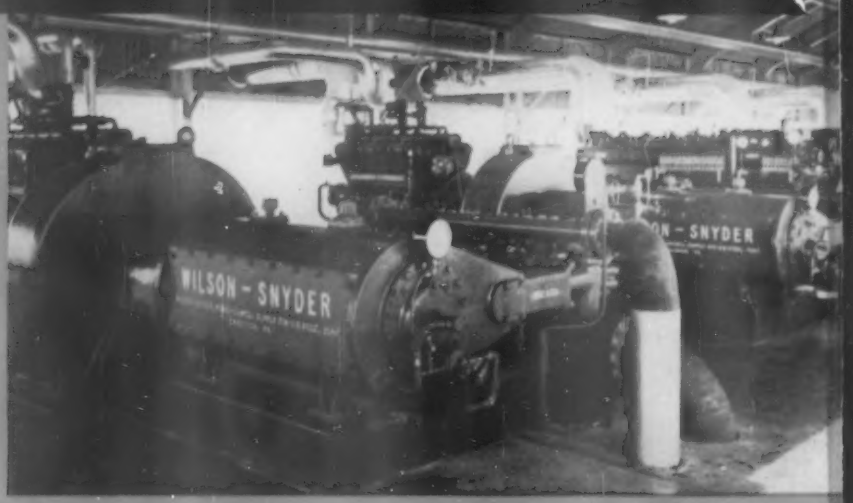
In the R. R. Dean Processing Plant near Agua Dulce, Texas

Quintuplex Plunger Pumps

. . . recycle lean oil in the absorption process at

HIGH PRESSURE



ENGINEERING, design, and construction of this plant were performed by O. L. Olsen Company of Houston, Texas for the Tennessee Production Company.

It was designed to process 100,000,000 cubic feet of gas per day, "floating" on Tennessee Gas Transmission Company's line pressure of 800 pounds; total plant pressure drop 8 pounds.

In the absorption process, two No. 558-P Wilson-Snyder Quintuplex Plunger Pumps recycle lean oil after it is refrigerated to 50 degrees F. Equipped with hardened steel plungers, heat-treated stainless-steel wing-guided valves and seats and driven through speed reducers by 340-hp Le Roi gas engines, each pump is capable of delivering 510 gpm at 1270 psi.

When You **. . . have pumping applications that call for dependable performance, let your "Oilwell" Representative quote on the type that will meet your requirements most economically . . . from our COMPLETE PUMP LINE.**

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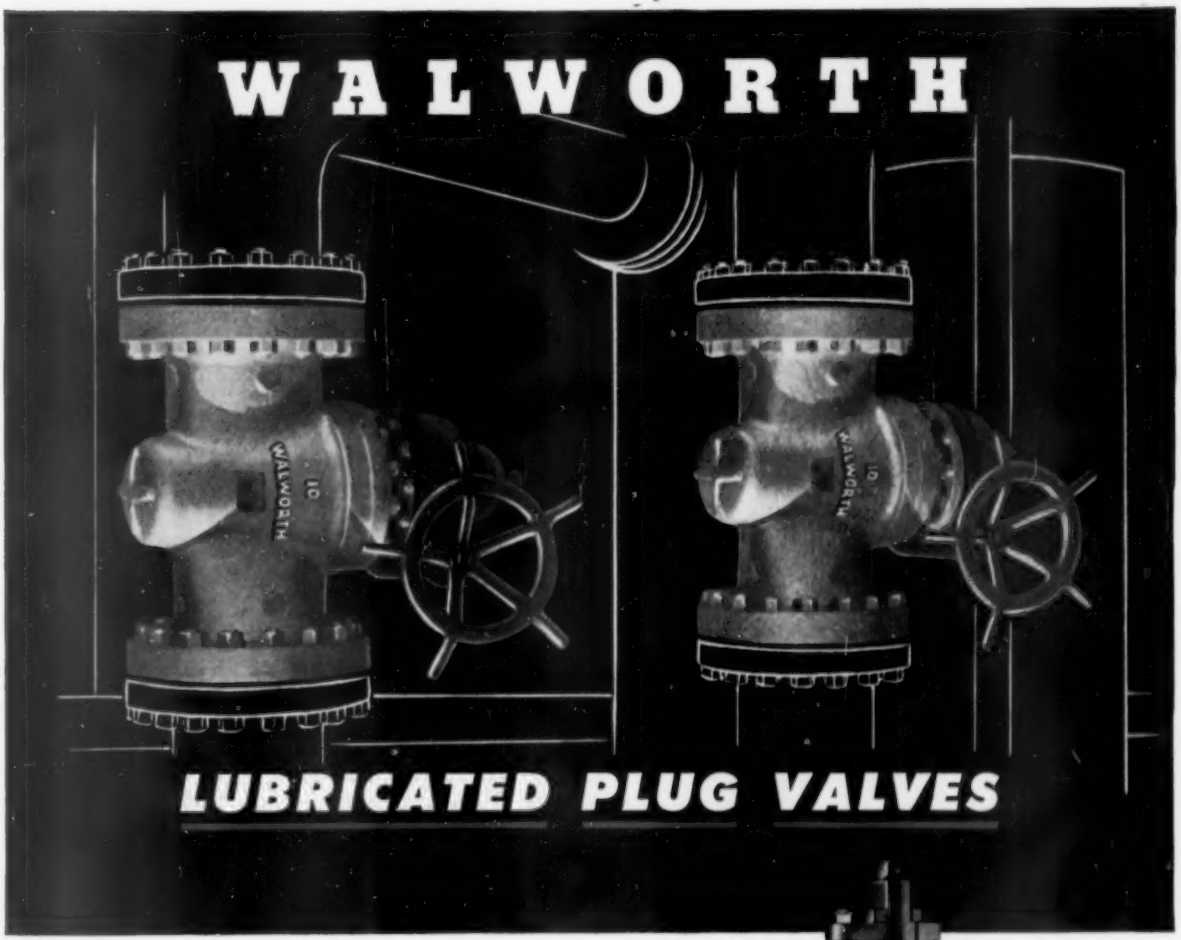
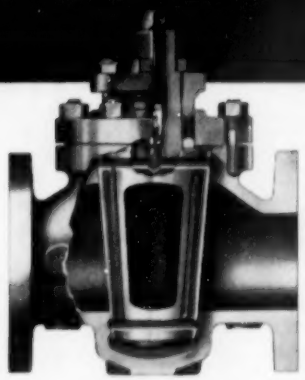


LUBRICATED PLUG VALVES

Better because ... **They are *pressure sealed* with an insoluble lubricant readily renewed while the valve is in service. Lubricant completely surrounds the plug ports assuring a tight seal against leaks. It also insures ease of operation by reducing friction between the body and the plug while at the same time protecting the finished surfaces against corrosion and wear.**



Lubricant system of a Walworth No. 1700F Regular Gland, Wrench Operated, Steel-iron, *Lubricated Plug* Valve. Other Walworth *Lubricated Plug* Valves include Single Gland, and Ball Bearing types. Sizes to 30-inches — pressures to 5,000 psi, and for vacuum service.

Walworth Lubricated Plug Valves are the most satisfactory valves available for the handling of gritty suspensions, and many other destructive, erosive, and corrosive industrial and chemical solutions.

They are ideal for general refinery and pipeline service.

For full information see your Walworth Distributor, or write for your copy of Bulletin 111. Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

What's the difference?

. . . just four or five degrees. But if it is the difference between actual and specified performance of a cooling tower, it is ultra-important. You may spend thousands or hundreds of thousands of dollars for a cooling tower; unless it delivers cold water at the temperature specified for economical operation it will cost more and more thousands in power cost or product recovery.

There is only one sure way to get what you pay for—to purchase a tower that will fulfill your performance specifications under test . . . in your plant. You can only obtain such a tower from a manufacturer whose engineering and research facilities are equal to the task.

Thirty years of research devoted exclusively to water cooling and a complete test plant enable Marley's cooling tower engineering staff (largest in the world) to predetermine tower performance scientifically and to verify it by actual test. That is why Marley not only invites but *urges* every customer to test his tower by any accepted test standard. Marley knows and positively guarantees that every tower it offers today will meet or exceed performance specification.

To help you determine this "difference" in cooling tower performance, Marley publishes helpful technical information to assist in testing all types of cooling towers. You can get this valuable information through Marley engineering representatives in all major cities, or by writing to the Technical Services Department of The Marley Company.

Founder-Member Cooling Tower Institute

The Marley Company

Kansas City, Mo.

MARLEY

Illustrated here are pictorial index pages from Grinnell's 92-page hanger catalog.

Grinnell has

pipe hangers and supports for every piping requirement, from simple water piping to high pressure, high temperature steam lines. No other company, anywhere, makes as complete a line of pipe hangers.

the **right** pipe hanger

If some detail of piping arrangement should make it necessary to deviate from hangers of standard design, it is important to remember that Grinnell will design and manufacture hangers to meet your special requirements. This is a service Grinnell freely offers.

to help you

Through Grinnell's efficient coast-to-coast system of strategically located warehouses and jobbers, you can purchase Grinnell Hangers "out of stock", anywhere. No other manufacturer of pipe hangers offers a distribution set-up as thorough or complete.

with every pipe hanging job!

Grinnell is ready to cooperate on all your pipe hanging assignments. For example, Grinnell will assist in the preparation of pipe suspension specifications. In addition, Grinnell, alone, of all manufacturers offers experienced field engineering service — maintains a staff of engineers who are ready to assist "on the job" with any problems in the erection of pipe hangers and supports.

GRINNELL

AMERICA'S No. 1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

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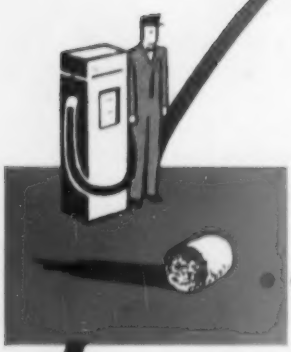
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

with ATLANTIC



. . . it's the catalyst that counts!

The Davison Chemical Corporation has teamed with The Atlantic Refining Company in the development of a catalyst for reforming straight run and cracked gasolines to a product of higher octane level. Among the important tasks delegated to Davison was the translation of this catalyst from laboratory to commercial production and at the same time import optimum selectivity, stability, ruggedness and regenerability.

Today, Davison is producing Atlantic Platinum Reforming Catalyst on a commercial scale and shipments are being made at an increasing rate to licensees of the Atlantic Catforming Process. Davison has an outstanding record of this type of development in many fields of commercial catalyst production. If you have a catalyst problem, see your Davison Field Service Engineer or write.

Progress Through Chemistry

DAVISON CHEMICAL COMPANY

Division of W. R. Grace & Co.

BALTIMORE 3, MARYLAND

PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, SUPERPHOSPHATES, TRIPLE SUPERPHOSPHATE, PHOSPHATE ROCK, SILICA GELS AND SILICOFLUORIDES. SOLE PRODUCERS OF DAVCO® GRANULATED FERTILIZERS

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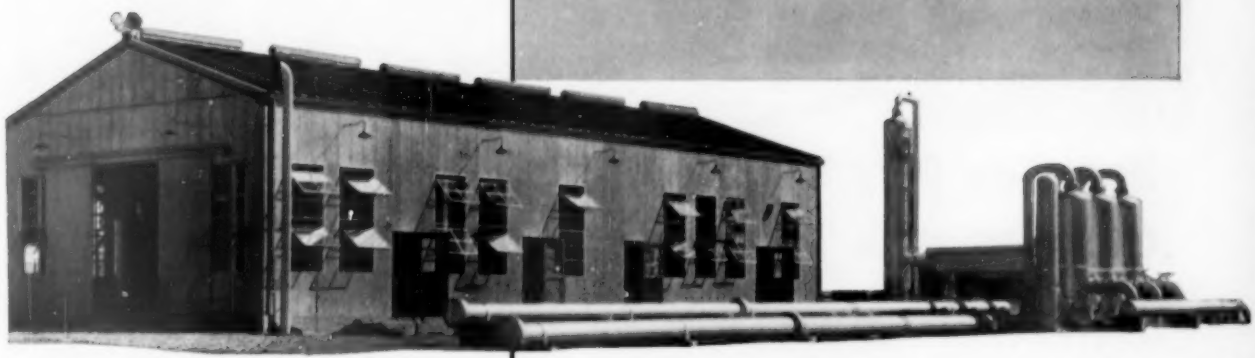
STEEL BUILDINGS

UNMATCHED for Economy, Utility, Flexibility, Attractiveness!



Parkersburg Steel Buildings cost substantially less than concrete block or brick buildings of similar size . . . are erected in only a fraction of the time . . . remain as good as new indefinitely with a minimum of care and maintenance . . . and can be dismantled and re-erected on a new location without loss of any parts.

They are available in structural, non-structural and multiple types for every oil industry need.

Before deciding on any building, write for our Steel Building catalog SB-6-53, or call your Parkersburg Representative who will work with you in selecting the type and size building best suited to your needs.

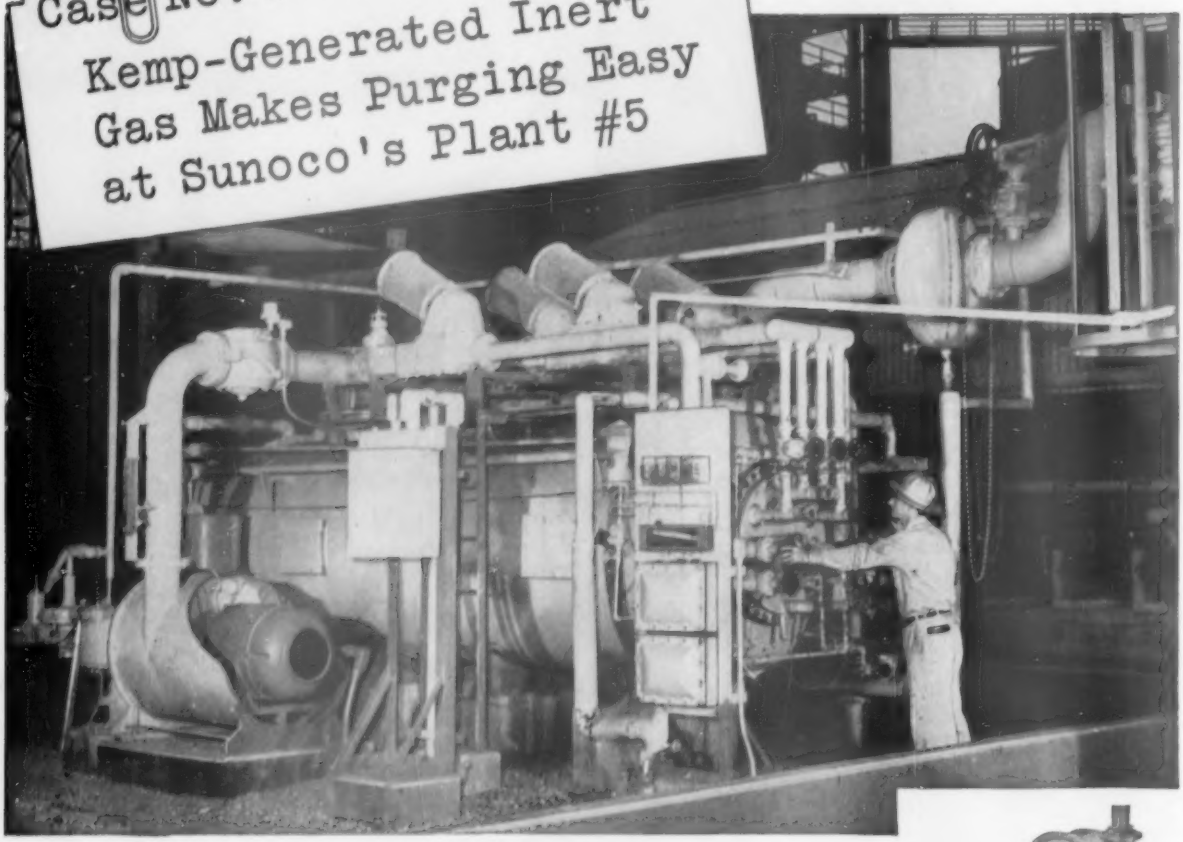
NO. 5412

PARKERSBURG
OIL FIELD EQUIPMENT

The Parkersburg Rig & Reel Co. Parkersburg, West Virginia
Division of Parkersburg-Aetna Corporation

Case No. 57

Kemp-Generated Inert Gas Makes Purging Easy at Sunoco's Plant #5



How Sun Oil's "Magic Mill" at Toledo operates with 'round the clock safety

There's no *one* word that strikes terror in the hearts of oilmen everywhere more quickly than F-I-R-E! To combat this threat at the Sun Oil Co.'s giant refinery at Toledo, Ohio, constant vigilance, checks and inspections are the answer. And the liberal use of inert gas for purging pipelines, tanks and crackers is essential to this safety maintenance.

Kemp selected to do the job

When plans called for *doubling* plant production in 1950, a new Kemp Generator (see above) was installed to insure adequate inert gas production. Fast-starting, easy-to-operate, this Kemp unit more than filled the bill. Today tanks and lines are periodically purged for inspection and cleaning *as often as needed*. And thanks to its 60,000 cu. ft. per hr. Kemp Inert Gas Generator, Sunoco enjoys *exact analysis* inert production that meets all its purging requirements.

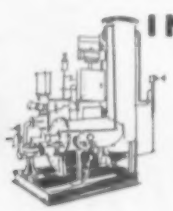
Let Kemp help you, too

If you have a purging or blanketing problem, why not let Kemp Engineers give you the same helpful advice used so profitably at Sun Oil's Toledo refinery. It costs you nothing to investigate. And it may save you money. Find out how Kemp's wide range of dependable, low-cost Generators (complete with the latest fire checks and safety devices) offer you the best way to solve your problems.

Photo above shows close-up view of Kemp Industrial Carburetor, the heart of every Kemp installation. Assures complete combustion... without waste, without tinkering. Reduces installation costs, simplifies maintenance.

***For more complete facts and technical information, write for Bulletin I-10 to:* C. M. KEMP MFG. CO., 405 E. Oliver Street, Baltimore 2, Maryland.**

KEMP OF BALTIMORE



INERT GAS GENERATORS

CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • ADSORPTIVE
DRYERS • SINGEING EQUIPMENT

. . . going places

The BEECHCRAFT Twin-Bonanza is the new favorite with those who want to go faster with more comfort and more luxury. BEECHCRAFT quality is apparent from the first glance, and that's real assurance of extra value, the ultimate of air travel.

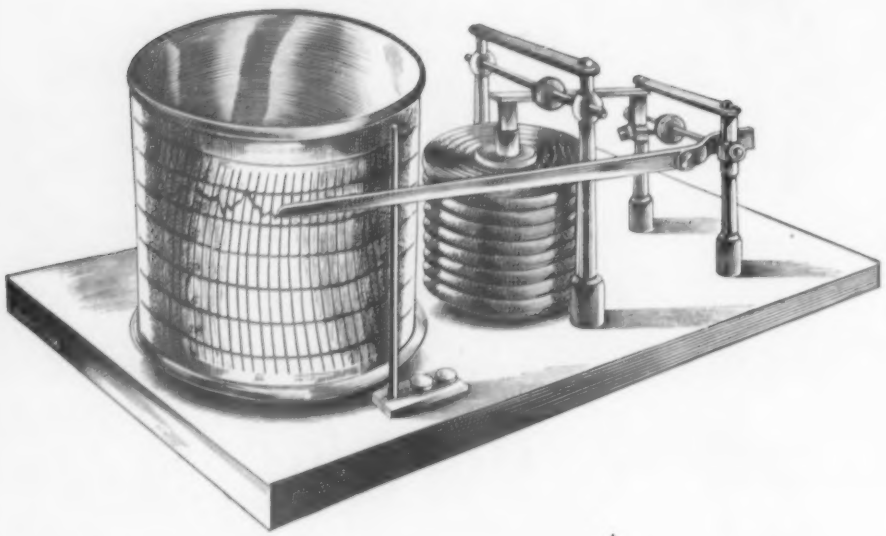
Travel is most restful in the big, six-passenger, roomy, extra-quiet cabin with its built-in visibility and all its stretch-out roominess... and you go when and where you want to go! Its *earning power* makes the new Twin-Bonanza a profitable investment in today's race for business expansion.

At full 6,000-pound gross load this newest twin-engine BEECHCRAFT has a cruising speed of 192 miles per hour at 10,000 feet, a rate of climb of 1,450 feet per minute, a service ceiling of 20,000 feet, a range of up to 1,088 miles, and outstanding single-engine performance.

Business leaders, like the military, have adopted this new Twin-Bonanza *as the 1954* personnel transport... it's a proved aircraft with a long-standing reputation for top performance. Investigate the Twin-Bonanza way of faster personal travel toward more business and more pleasure. See your BEECHCRAFT dealer or distributor, or write Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

RESPONSIVE



One characteristic of America's fast-moving industry is that banking requirements are continually changing. The Bank of New York endeavors always to adapt its services to the needs of large and small companies in every type of industry.

You will find this Bank responsive to your requirements, progressive in outlook and resourceful in meeting situations that call for modern banking service.

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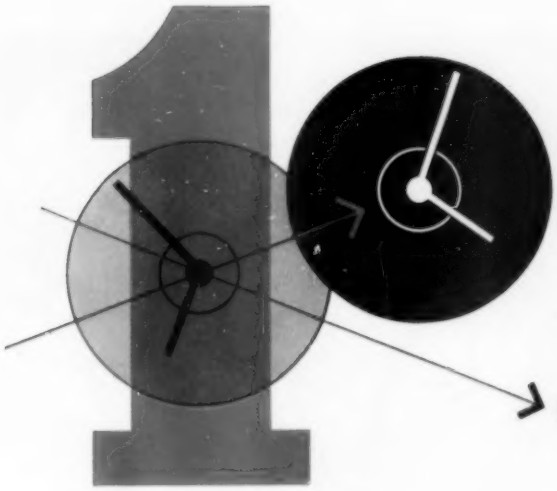

ONE
TRIP
TOOL
CUTS DOWN TIME

HALLIBURTON'S
RETRIEVABLE PACKER

In one trip, the Retrievable Packer is the proper tool to quickly perform a series of squeeze jobs. In one trip, the Packer tests for casing leaks in as many places as needed. In just one trip, the Halliburton Retrievable Packer *completes all the work* and gets out fast!

Under normal conditions, the tool is on the bank about an hour after cement is placed. And when the Packer is out of the well, you are ready to go back to work—nothing is left to drill out.

The entire assembly consists of the slip body with hydraulic slips, two packer cups and a circulating valve. Nothing more is needed—and this simplified mechanism allows faster operations. Friction drag springs contact inner wall of casing to keep circulating valve open and to keep the circulating valve closing sleeve above mandrel ports—permitting fluid to equalize through the tube and speeding up entry on drill pipe or tubing.

The hydraulic slips are moved out and engage the casing wall by applied fluid pressure. At the same time, rubber cups are expanded against casing wall. As fluid pressure increases, the rubber cups seal tighter and slips are set so firmly that normal squeeze pressures can be applied.

The operations are as simple as that—which helps to explain the dependable, accurate results that save many hours on a variety of remedial jobs. Give the Halliburton Retrievable Packer a chance to save rig time for you. One call will bring you all the advantages of the *proved, one trip, time saving tool!* Call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

CEMENTING SERVICES

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING

it often takes a Specialist

AVONDALE

It has been proven time and again that the services of a SPECIALIST are well worth while. Take for example the many special construction, repair and fabrication jobs required by the Oil Industry. Jobs such as these MUST be done by experts . . . men who possess that special knowledge that is the product of years of experience and uncompromising skill. For your next job, large or small, call in a Specialist . . . AVONDALE!

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Towboats
Tugboats
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Repairs

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AVONDALE MARINE WAYS, INC. CABLE ADDRESS "AVONWAYS"

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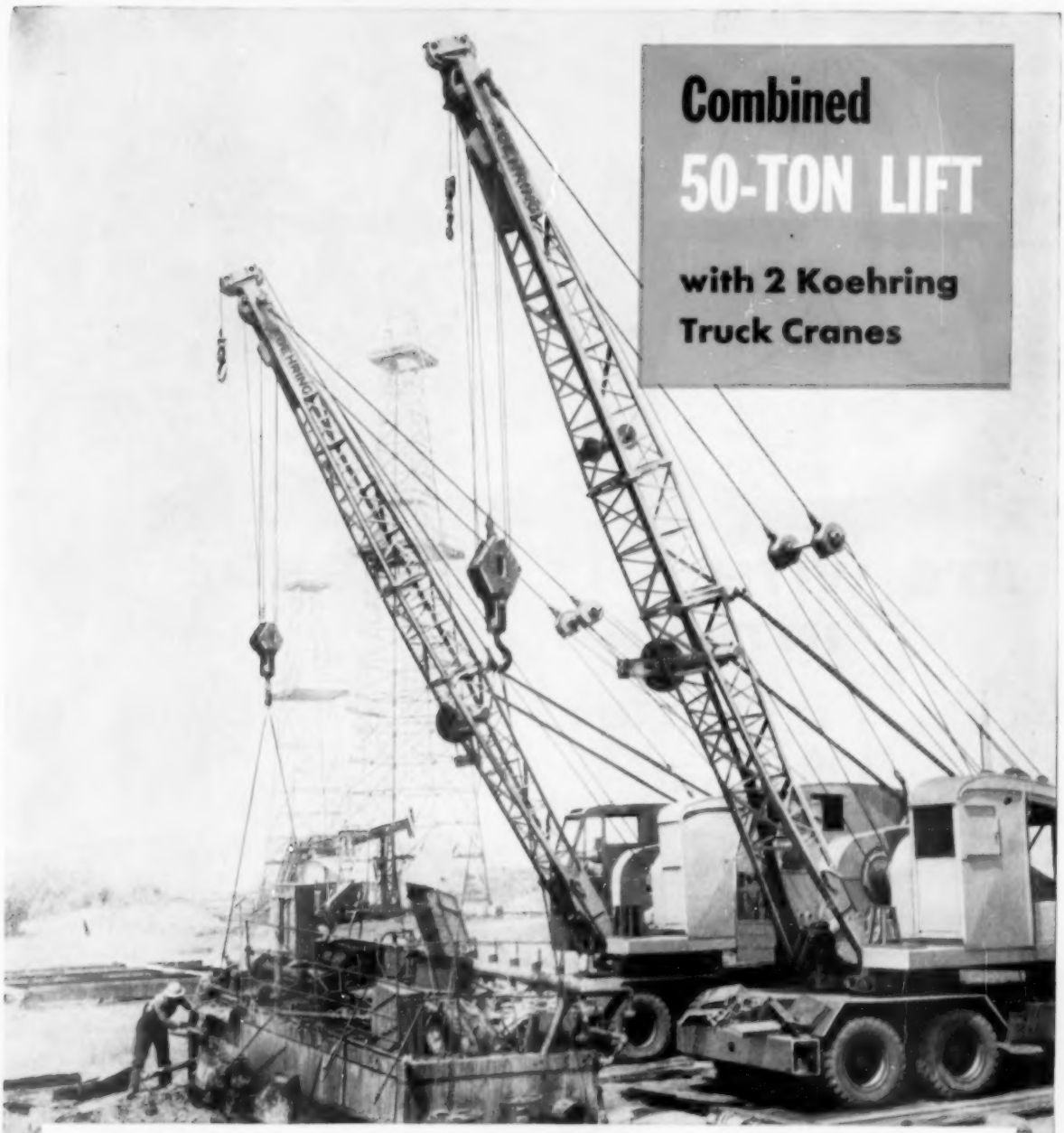

Combined 50-TON LIFT

with 2 Koehring Truck Cranes

Lifting a heavy mud tank assembly into place, two Koehring 304 Truck Cranes (above) worked as a team . . . exerted a total lift capacity of 50 tons. As the cranes inched the bulky load into position, power-boom lowering provided safe, positive control. Mechanical booster clutch on each crane retained exceptionally accurate "feel" of load during lifting and lowering. On heavy work like this, Koehring 304 booster clutch provides another important advantage. It reduces operating effort . . . requires only one-third to half the lever pull of a straight manual clutch.

This heavy-duty 25-ton crane also converts to dragline, clamshell, pile driver, ¾-yard shovel or hoe . . . is available on rubber-tired truck, cruiser mounting, or heavy-duty crawlers to suit all working conditions in the oil field. Get complete details from your Koehring distributor, or write for your copy of new 36-page 304 catalog.

KOEHRING COMPANY

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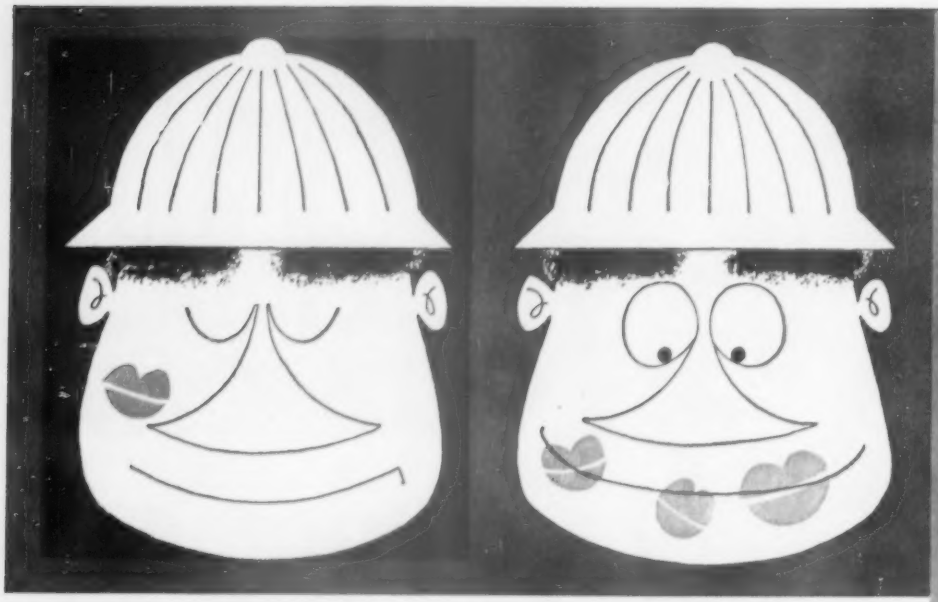
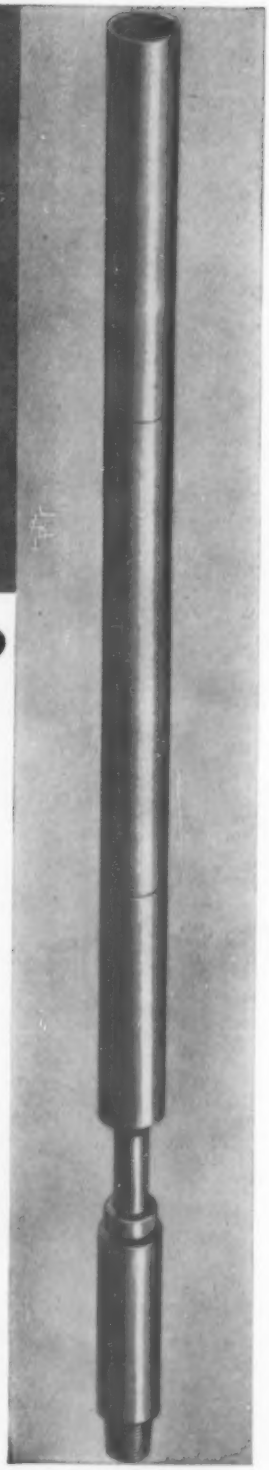
Subsidiaries: PARSONS KWIK-MIX • JOHNSON

K371

CRANES up to 79½ TONS lift capacities . . . EXCAVATORS ½ to 2½ yards





HITS WITH ANY DESIRED INTENSITY!

the Johnston-Sutliff HYDRAULIC JAR

The Exact Pressure You Want, from a gentle tap to a rugged bump! Changes to meet varying conditions without coming out of the hole; needs no torque!

Only Two Moving Parts! You're sure of dependable service plus easy operation! And the Johnston-Sutliff Hydraulic Jar is available in all drill pipe sizes!

Adaptable for Use with the Johnston Formation Tester, the Johnston-Sutliff Jar is just as effective for fishing or any other job where pipe or equipment is lodged in the well!

AVAILABLE *everywhere* • ACCURATE *every time!*

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FORMATION AND JOHNSTON CASING TESTING

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J543

Drills 33 70-foot holes in eight hours with **DENISON** hydraulic equipment

Speed and ease of drilling by hydraulics does it.

Here's how The Superior Oil Company, Houston, has modernized and simplified a shot-hole rig to drill faster, easier. A Denison Pump/Motor furnishes hydraulic pressure to raise the mast . . . and also drives another Denison Pump/Motor for the drill pull-down.

The pump/motor used for the pull-down is only 9 inches long, weighs only 19 pounds . . . *yet has enough power to actually lift the truck off its wheels.*

For drilling, for many other oil industry applications, look to Denison hydraulics for faster, easier-operating, lower-cost power equipment. Send for latest bulletins on Denison hydraulic pumps, motors and controls. Write to: THE DENISON ENGINEERING COMPANY, 1176 Dublin Road, Columbus 16, Ohio.

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LOOK BEFORE YOU BUY

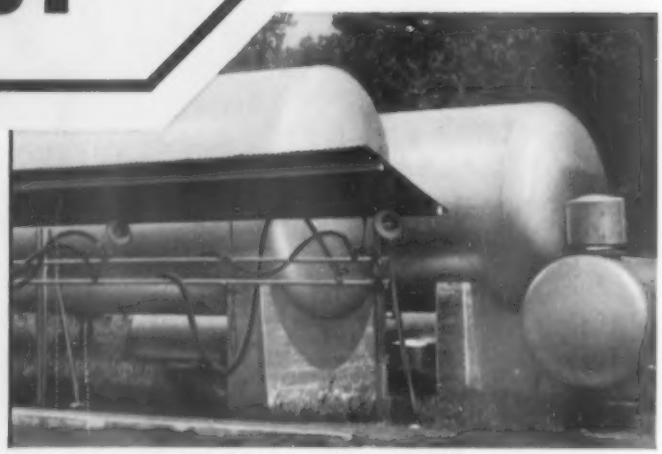

PHOTO COURTESY SUBURBAN PROPANE GAS CORPORATION

Few manufacturers have the skill or the means to put ACF quality in tanks...yet prices are identical. That's why it pays to look before you buy!

When you're in the market for storage tanks for propane or anhydrous ammonia, or any pressure gas this difference in quality pays tremendous dividends...in service, in low maintenance, in extra safety.

ACF manufacture not only x-ray inspects every inch of welded seam, but completely stress relieves the finished tank (to banish stresses set up by welding). Few other manufacturers have the facilities to do this.

Look before you buy, get unmatched value, yet pay no more. An ACF Representative will be glad to explain the details. Literature is available on ACF Storage Tanks and all types of Safety Valves. Write ACF Industries, Incorporated, New York • Chicago • St. Louis • Cleveland • Washington • Philadelphia • San Francisco

Quality you can trust

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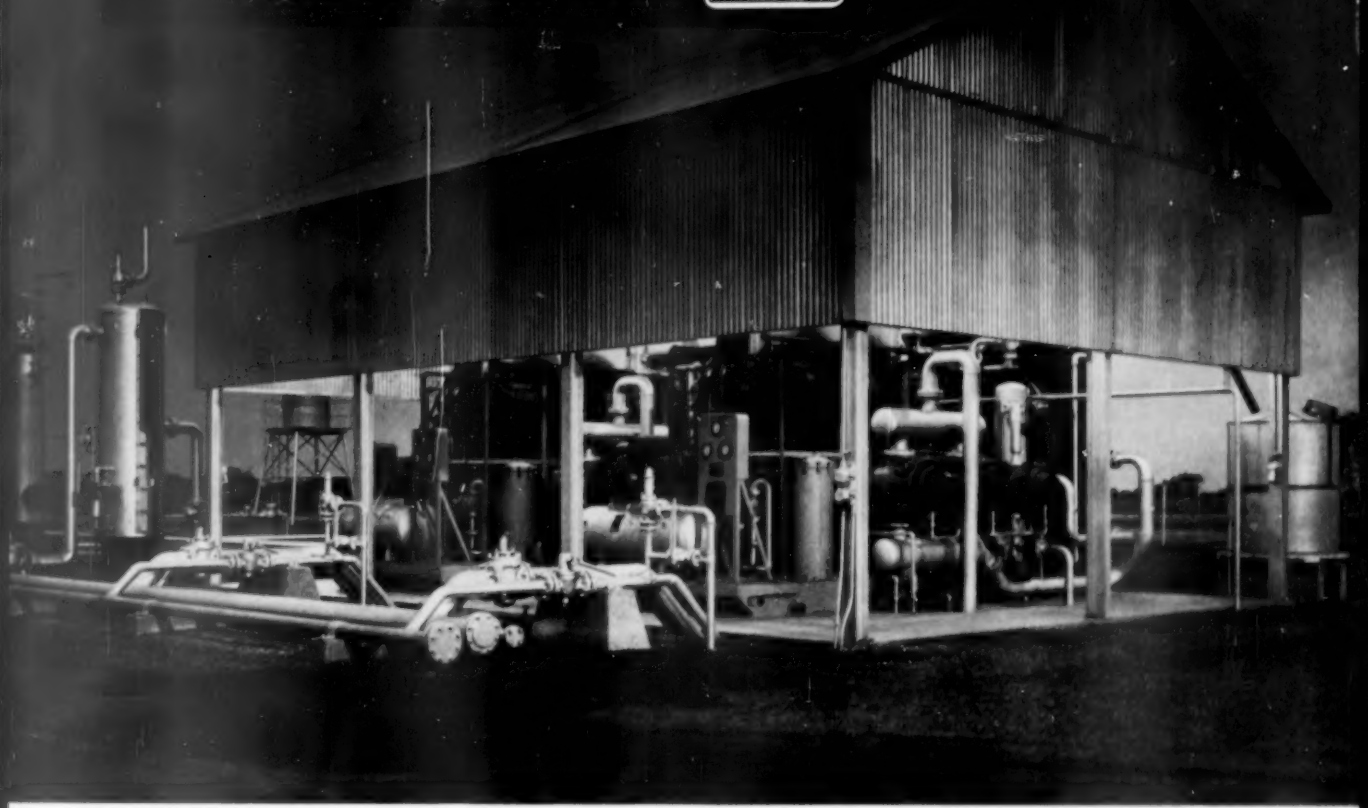
STORAGE TANKS • TRUCK TANKS • SAFETY VALVES

BEAIRD-INGERSOLL-RAND
Packaged Compressor Plant

Lowest Cost Per Horsepower Installed



This packaged compressor plant is complete with two Beaird-Ingersoll-Rand 6SVG, 340 h.p. gas engine driven compressors, Young radiators and all necessary equipment and controls. Other sizes from 110 h.p. to 660 h.p.

Operating Profits Increased —

PACKAGED COMPRESSORS OPERATE GAS LIFT . . . CONSERVE FLARE GAS

SEABOARD OIL COMPANY designed their Plymouth compressor station to meet rapidly increasing gas lift requirements and to convert to profits 1,500,000 cubic feet of gas being flared daily.

With an eye toward future development of the field two Beaird-Ingersoll-Rand packaged compressors were installed. These units have a combined capacity of 3,140,000 Std. cu. ft. of gas per day when operating with suction at a constant pressure of 28 psig and discharging at 750 psig. Necessary controls are incorporated in the design to operate at discharge pressures ranging from 750 psig to 1000 psig. There is ample capacity for gas lifting and the delivery of excess gas into the sales line.

Designed into Beaird's flexible packaged compressor is an automatic speed control to adjust for variations in the rates of gas production. The #1 unit is operated at constant speed while the speed of the #2 unit is automatically increased or decreased to maintain a constant suction pressure.

A plus feature of the Plymouth station is its automatic operation. Built-in controls guard the plant day and night against sudden changes in operating conditions. The entire installation has required no additional personnel.

Beaird packaged compressor plants are also adaptable to gas boosting, repressuring, air compression, refrigeration, pipeline testing and other services in the field where gas is compressed.

Let us show you how a Beaird-Ingersoll-Rand packaged compressor plant can be designed to meet your requirements.

THE J. B. BEAIRD COMPANY, INC.

Shreveport, Louisiana

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

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PRESSURE BULK STORAGE

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LP-GAS SYSTEMS

CALL BETHLEHEM FOR PLATE STEEL Bethlehem sheared and universal plates come in a complete range, to meet virtually every need. We produce the following types in a wide size range — Flange, Forging, Firebox, Structural, Abrasive-Resisting, Medium-Manganese, Mayari R (high-strength, low-alloy), Alloy and Marine. For full information, write to the nearest Bethlehem office.

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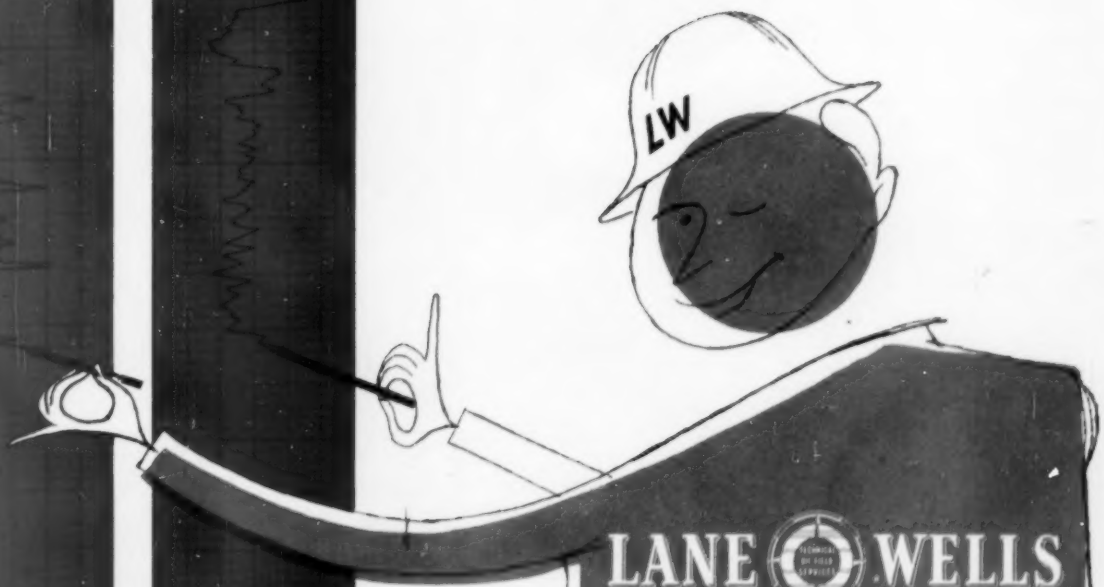
at once

Cut your downtime by getting two (plus the collar log) in the time of one...and get the same fully-detailed curves, the same reliable down-hole data **proved** accurate in more than 68,000 Lane-Wells Radioactivity Well Logging jobs!



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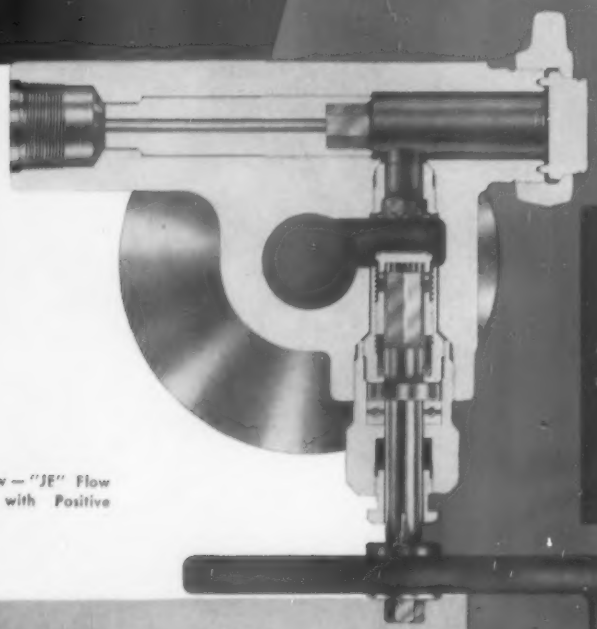
AR-710

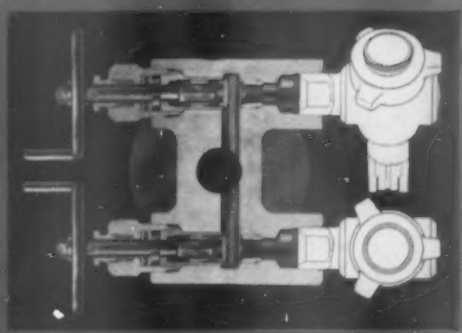
Best Seller

because it's the Best Buy!

O·C·T "JE" FLOW CONTROLS



Top View — "JE" Flow Control with Positive Choke.



The O-C-T Dual Flow Control is an outstanding companion to the "JE" Flow Control units which have gained universal acceptance in oilfields all over the world. This unit replaces 13 different fittings.

Since O-C-T introduced this compact, easy-operating "JE" Flow Control Unit in 1946, **more trees of all makes** have been topped from the master valve up with this unit than any other make. And there is good reason why O-C-T "JE" Flow Control Units are now on nearly 10,000 trees. ***It is the only flow control on the market that gives you the advantage of both a choke and a true valve type gate assembly and seating arrangement.*** The valve in your O-C-T Flow Control unit is a complete valve type gate assembly . . . with ball bearing construction to assure easy, quick operation. Specify O-C-T "JE" Flow Controls to your supply store. Use it to replace a tee or cross, wing valve, choke and bottom hole test adapter. Use it to save as much as $300.00 on every tree. Let your O-C-T representative show you the many other advantages that have made "JE" Flow Controls the most dependable product ever offered the oil industry. All O-C-T products are available through more than 700 supply store locations.

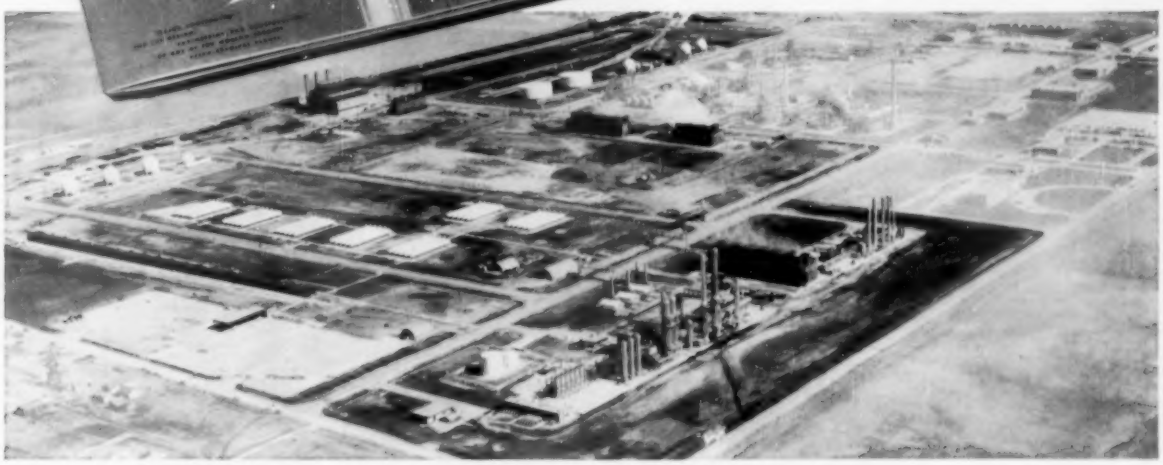
O-C-T makes the only flow control unit that gives you the advantage of both a choke . . . positive or adjustable . . . and a true valve type gate assembly in a single compact unit.

Oil Center Tool Co.

P. O. BOX 3091, HOUSTON, TEXAS

Export Representatives: Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

Like to have a picture story of this petro-chemical plant?



Write for this booklet today!

Here's a brochure that's almost as good as a guided tour through the Tuscola, Illinois plant of National Petro-Chemicals Corporation. It's a picture story, in brochure form, of the design, construction and engineering of one of the world's largest petro-chemical plants.

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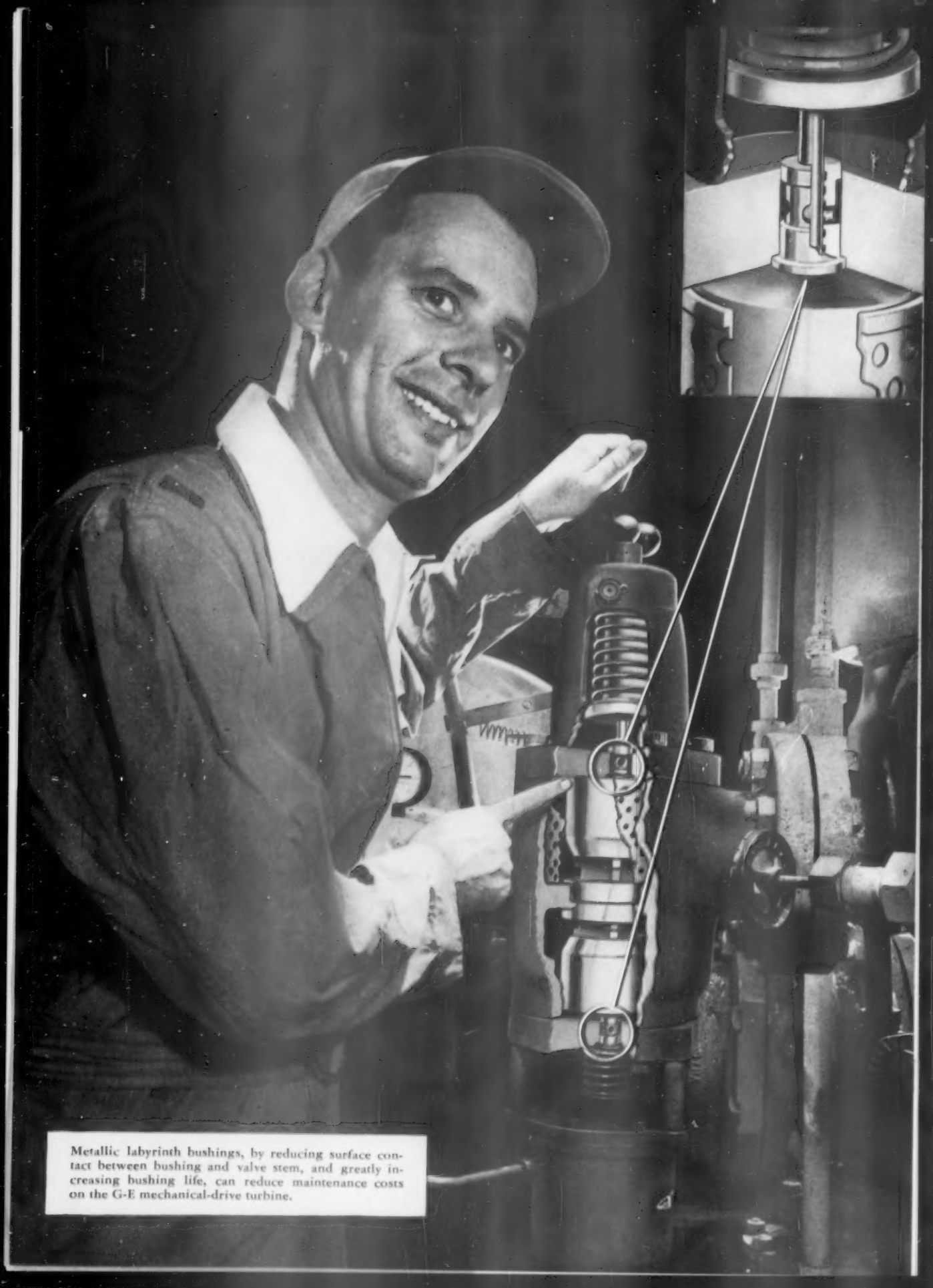


Metallic labyrinth bushings, by reducing surface contact between bushing and valve stem, and greatly increasing bushing life, can reduce maintenance costs on the G-E mechanical-drive turbine.

ANOTHER PLUS VALUE OF G-E MECHANICAL-DRIVE TURBINES...

Metallic Labyrinth Bushings Cut Turbine Maintenance Costs

Using metallic labyrinth bushings instead of soft packing on the throttle valve stem and operating valve stem of General Electric's Type DP mechanical-drive turbine has several important advantages. Corrosive attacks on the valve stems, often caused by soft packings, are prevented.

Because surface contact between bushing and valve stem is reduced to a minimum, friction is practically eliminated—bushing life is increased tremendously. This feature alone can save you up to $50.00 in direct maintenance costs—plus the expense of down-time caused by frequent packing replacements.

HERE'S ANOTHER ADVANTAGE. Since frictional drag on the governing system is reduced to a minimum, you get more accurate, sensitive, reliable governing with G.E.'s Type DP turbine.

Metallic labyrinth bushings make an effective steam seal by means of grooves in the bushing which throttle pressure and minimize any steam leakage (see illustration).

THESE METALLIC LABYRINTH BUSHINGS are just one of many DP features which save you money throughout total turbine life. The chart below indicates other areas of savings.

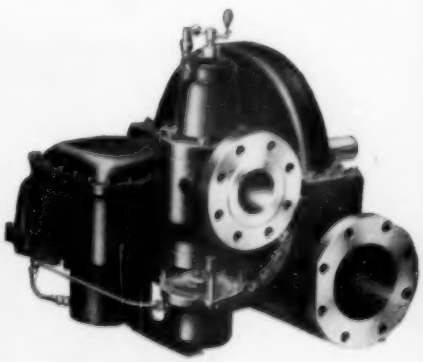
Remember—the total cost is often more than just the sales price. But G.E.'s standard DP turbines include the extra features that save you extra costs. For more information contact your nearest G-E apparatus sales office. Write for bulletin GEA-4955A, "A New Standard in Mechanical-drive Turbines." General Electric, Schenectady 5, N.Y.

252-66

GENERAL ELECTRIC

INSTALLATION AND MAINTENANCE COST-SAVING FEATURES

THESE EXTRA FEATURES, STANDARD ON ALL G-E TYPE DP TURBINES, CAN . . .	Save You up to
COMBINED TRIP-THROTTLE VALVE Eliminate extra cost of buying and installing valve ahead of the turbine.	$200.00
SINGLE RESERVOIR FOR COOLING LUBE OIL Eliminate extra cost of piping cooling water to and between bearings.	50.00
MAJORITY OF PARTS INTERCHANGEABLE One set of spare parts protects several units—less money tied up in inventory.	100.00
METALLIC-LABYRINTH VALVE STEM BUSHING Eliminate labor costs of replacing soft packings; cut down-time production losses.	50.00
SHAFT MONEL-SPRAYED AT PACKING FIT Saves frequent cost of purchasing and installing carbon rings; contributes to long shaft and packing life.	20.00
ESTIMATED TOTAL SAVINGS	$420.00



G-E Type DP Mechanical-drive Turbine

COMPARE THE FEATURES
EVALUATE ALL THE COSTS

See why G-E Standard Type DP turbines are your most economical buy.

Right where you want it

. . . salvaging oil from a slush pit
. . . removing water around storage tanks
. . . transferring oil from pipe line to tank truck
. . . dewatering around a drilling location
. . . in general utility service around pipe lines and refinery, the REX® Speed-Primer Self-Priming Pump outperforms all others.

Right When you want it!

. . . patented air peeler means pump is always in *prime* of life
. . . instant starting in cold and wet weather
. . . maximum capacities with mud and debris-filled water
. . . easy inspection and maintenance against time limits
. . . always a great performance on any job under toughest field conditions—*every time.*

Rex Speed-Primer Pumps

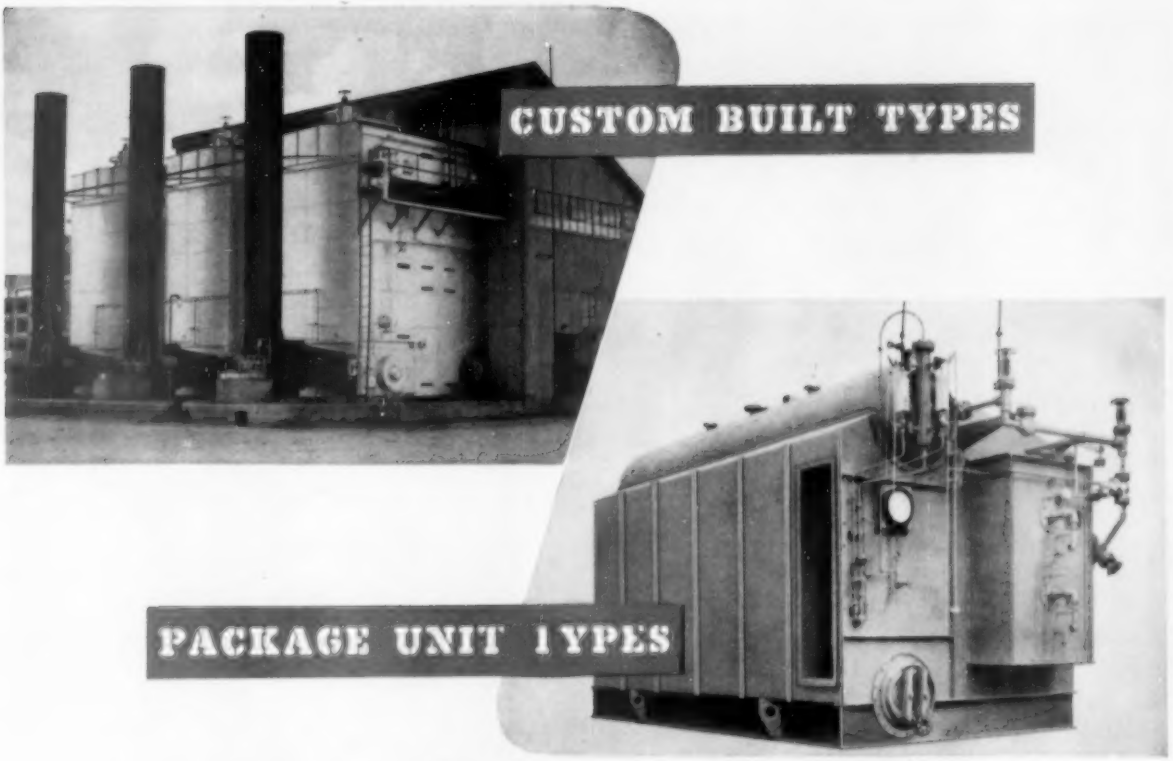
. . . just check these outstanding advantages:
*Simplest pump ever designed
*Most accessible
*Highly portable
*Simplest, most positive leakproof seal
*And most important—the Rex is the only pump with the patented adjustable air peeler that maintains new pump efficiency for the lifetime of the pump.

CHAIN BELT COMPANY

CHAIN BELT REX COMPANY ®

4619 W. Greenfield Ave., Milwaukee 1, Wis.

Rex Oil Field Sales Offices Are Located in the Following Cities: New York • Tulsa • Dallas • Houston • Midland • Los Angeles



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for modern Steam Generators

Types and Sizes for Every Power, Processing and Heating Requirement

Steam costs too high? Then it's high time to replace outmoded boilers with modern Vogt steam generators of the type and size to exactly fit in with specific operating conditions.

Vogt steam generators are designed to give maximum rating in minimum space, with high efficiency and low maintenance expense. They are available in bent tube types and straight tube, forged steel sectional header types for solid, liquid or gaseous fuels burned singly or in combination.

Package units range from 10,000 to 30,000 pounds capacity and custom built units are obtainable in the larger capacities. Many installations in successful operation are proof of Vogt's ability to give effective help in the solution of steam generating problems. Bulletins may be had upon request.

HENRY VOGT MACHINE CO.
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5 REASONS WHY QUALITY-CONTROLLED SPANG® CW STEEL PIPE IS TOPS FOR OIL COUNTRY SERVICE

TOP GRADE STEEL—Only top grade steel skelp goes into SPANG CW Steel Pipe . . . makes SPANG CW easy to bend and thread.

STRONG, UNIFORM WELDS—Automatic heat control eliminates temperature deviations during SPANG CW forming and welding . . . produces highest quality welds . . . assures pipe strength.

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COMPLETE INSPECTION AND TESTING—Each length of SPANG CW is inspected visually inside and outside . . . and pressure-tested and hydro-static-tested for strength and durability.

This care in producing SPANG CW Steel Pipe produces a rugged product . . . built for oil country use in water systems, air lines, gas lines, water flooding lines, oil gathering systems and salt water disposal lines.

Try SPANG CW Steel Pipe in your operations. You can get it in a full range of sizes at any National Supply Store.

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SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

HOW QUICK CAN YOU CLOSE A VALVE?

That depends on the size and type of valve, of course. But with a Rockwell-Nordstrom valve it's only a quarter-turn eased by a film of lubricant.

Another thing—with simple maintenance a Nordstrom valve will never stick or leak in an emergency. The same lubricant that makes turning easy is also a hydraulic jack to free the plug, and at the same time is a leak-closing pressure seal around the valve ports.

Specify the original lubricant seal valve. There's no substitute for Rockwell experience—use it to save money on valves. *Rockwell Manufacturing Co., Pittsburgh 8, Pa.*

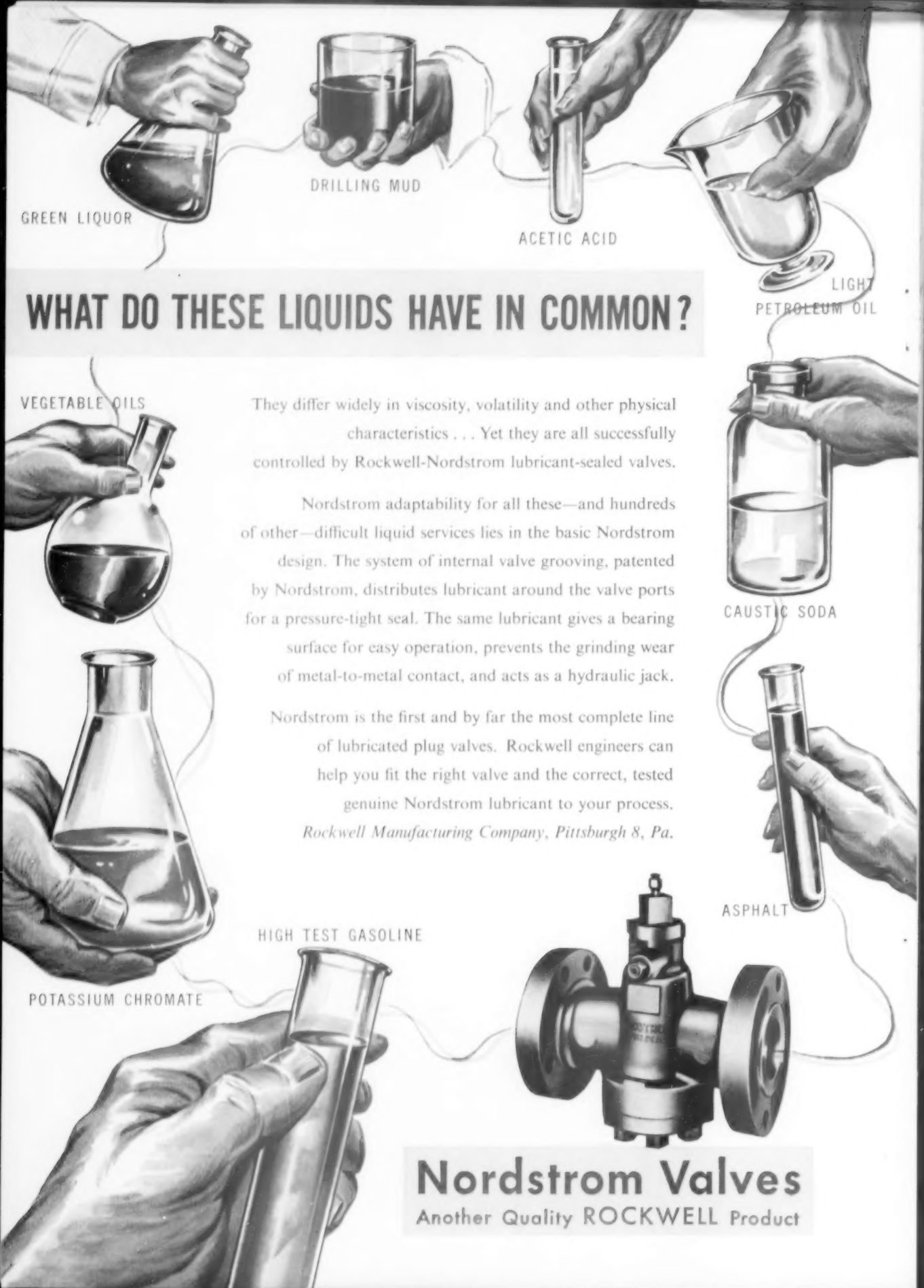
THREE WAYS
THE NORDSTROM LUBRICANT WORKS

1. Lubricant surrounds each valve port with a vapor tight pressurized seal. **Nordstrom valves stay tight.**
2. Lubricant acts as hydraulic jack—a fast quarter-turn to open or close. **Nordstrom valves operate quickly.**
3. Lubricant coats the plug for sliding action—no wear-producing wedging. **Nordstrom valves operate easily.**

Rockwell Built

NORDSTROM VALVES

Lubricant-Sealed for Positive Shut-Off



WHAT DO THESE LIQUIDS HAVE IN COMMON?

They differ widely in viscosity, volatility and other physical characteristics . . . Yet they are all successfully controlled by Rockwell-Nordstrom lubricant-sealed valves.

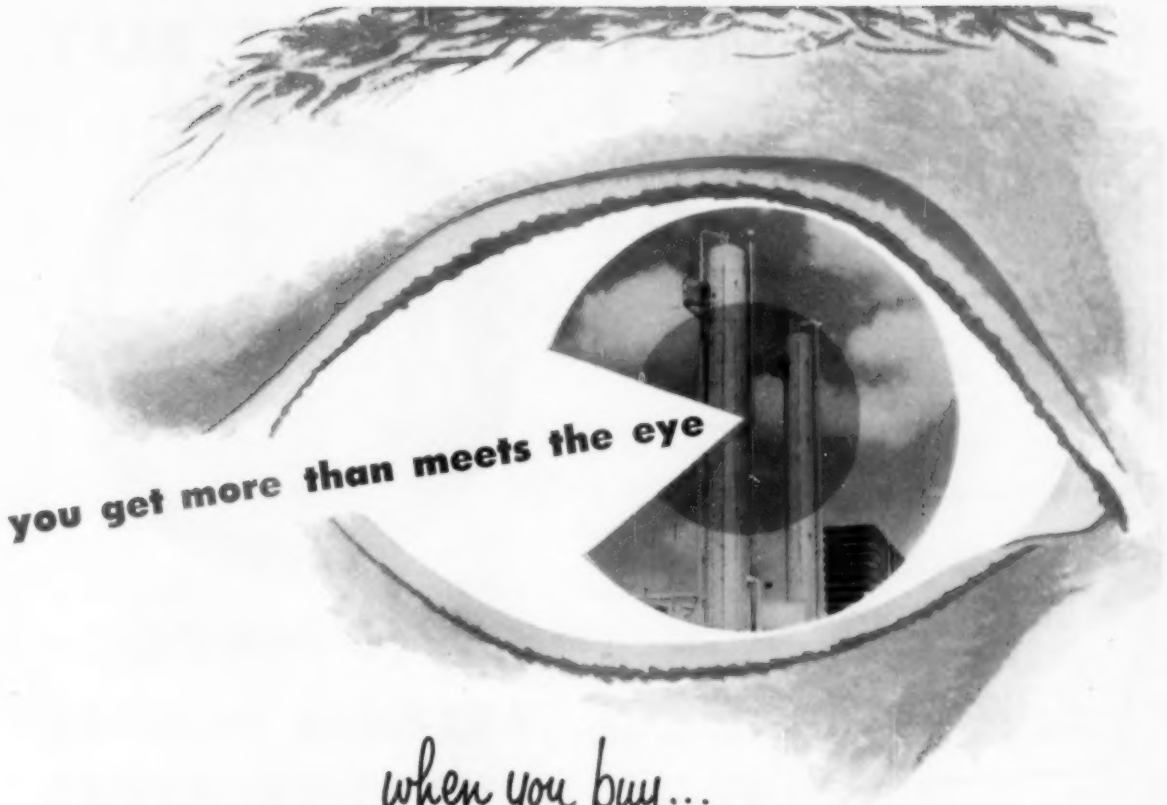
Nordstrom adaptability for all these—and hundreds of other—difficult liquid services lies in the basic Nordstrom design. The system of internal valve grooving, patented by Nordstrom, distributes lubricant around the valve ports for a pressure-tight seal. The same lubricant gives a bearing surface for easy operation, prevents the grinding wear of metal-to-metal contact, and acts as a hydraulic jack.

Nordstrom is the first and by far the most complete line of lubricated plug valves. Rockwell engineers can help you fit the right valve and the correct, tested genuine Nordstrom lubricant to your process.

Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Nordstrom Valves

Another Quality ROCKWELL Product



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from **CARBIDE**

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Yes! You get *more* than drums and tank cars of the best gas-treating chemicals . . .

YOU GET . . .

- the results of CARBIDE's 20 years' experience in their manufacture.
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- the benefit of CARBIDE's knowledge about the handling, properties, and use of these chemicals.
- the assurance of availability and fast service through CARBIDE's national distribution network of 50 warehouses. (In Canada: Harrisons & Crosfield's.) Shipments are made in tank cars, tank wagons, and drums in carload or truckload lots.

REMEMBER: You get more *than chemicals when you do business with CARBIDE.*

By all indications **YOUR BEST BUY**

CLIMATE-PROOF CASE. Rain tight . . . snow tight . . . dust tight . . . sand tight . . . frost tight. The American Bi-Metal Thermometer can withstand submersion, hot blasts, dust, hot gases, extreme temperature changes and long exposure to the elements.

MAXIMUM RESPONSE — MINIMUM FLUTTER. Highly sensitive dampening fluid on bi-metal coil assures fastest response to temperature changes and greatest resistance to pointer flutter and destructive vibration.

ALL WELDED STEM CONSTRUCTION. Processing media cannot seep into case. Stem is stainless steel — corrosion-resistant — contributes to longer thermometer life.

Refineries, chemical and other processing plants find the American Bi-Metal Dial Thermometer "tops" for on-the-spot temperature readings.

Accurate

AMERICAN BI-METAL DIAL THERMOMETERS

Accuracy is guaranteed within 1% of the scale range. Application is simple and fast. Adequate clearance at back of case permits easy use of wrench during installation. Get complete information about these precision-built, long-life thermometers. Write for Bulletin 144.

YOUR INDUSTRIAL SUPPLY DISTRIBUTOR is as close as your telephone. Take advantage of the broad experience of his organization and his ability to meet your most exacting requirements quickly from local stocks.

SPECIFICATIONS

Temperature Ranges: From minus 60° to 1000° F.

Dial Sizes: 3½" and 5". Graduations over full 270° arc.

Case: Aluminum alloy with smooth, black enamel instrument finish.

Bezel: Screwed to case.

Front: Heavy plate glass set in channeled gasket seals the case.

Pointers: Adjustable type attached with set screw; easy to get at for setting.

Connection: Fixed, ½" N.P.T.

Separable Sockets: Available for use in closed systems or where the measured medium is corrosive to the stainless steel stem. Fit over all standard stem lengths except 2½".

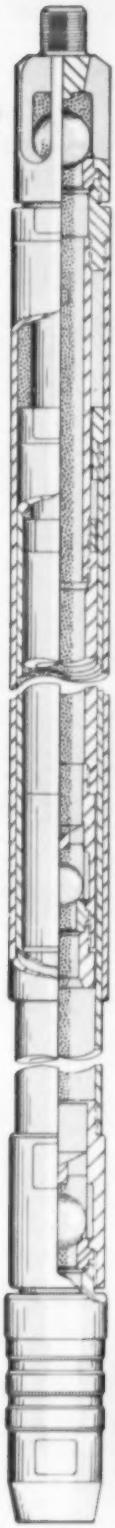
1850 AMERICAN U S A

AMERICAN INDUSTRIAL INSTRUMENTS

MAXWELL MANNING MOORE MM&M TRADE MARK

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' AND 'AMERICAN-MICROSEN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, AIRCRAFT PRODUCTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.



. . . . FOR SANDY WELLS

This Triax pump is new.

It recognizes, employs, and improves some old principles.

It does a wonderful job in sandy wells... an example of Axelson efficiency.

See it, ask about it, and get an illustrated folder at any J&L store.

AXELSON

The Triax is a traveling barrel type pump with three tubes and a bottom cup hold-down. The inner and outer tubes are chromium plated, and the balls and seats (Axloy) are of stainless steel.

It comes in three lengths and two sizes, for wells from 2000′ to 5000′.

J&L STEEL

Jones & Laughlin STEEL CORPORATION

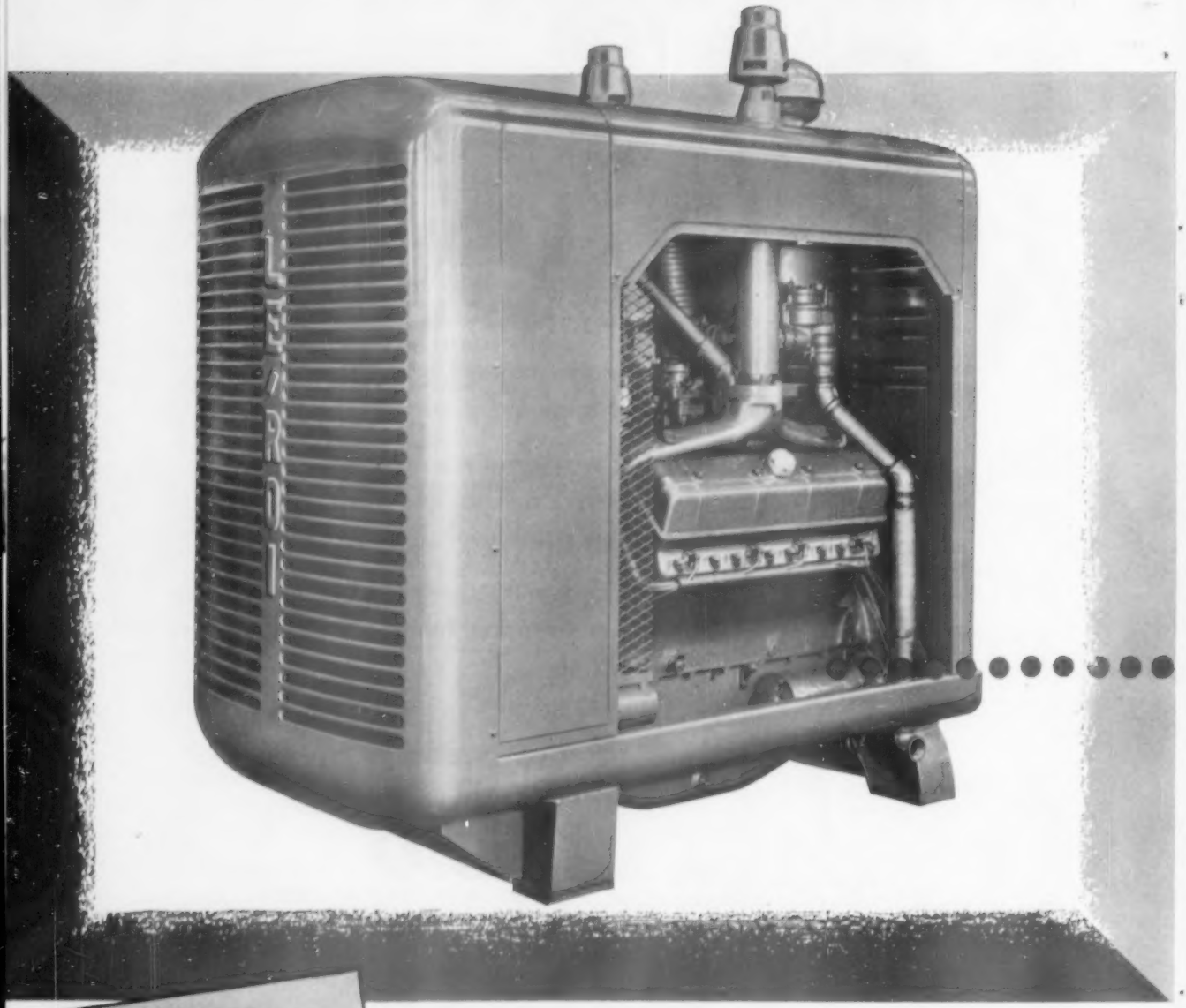
SUPPLY DIVISION – TULSA, OKLAHOMA

Serving The United States and Canada

PESA

PARTNERS IN PETROLEUM PROGRESS

New Le Roi H844



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North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

Mississippi, Arkansas and Northern Louisiana
Ingersoll Corporation — Shreveport, Louisiana, El Dorado, Arkansas and Clarksdale, Jackson, Mississippi.

West Coast
Le Roi Engine Sales Co. — Long Beach, California

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

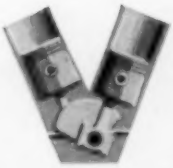
Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

225-hp V-8 Engine

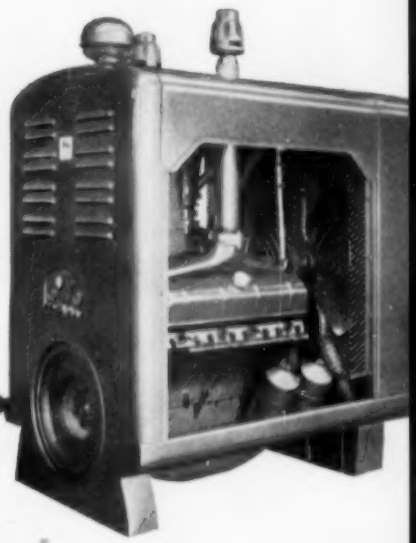
New performance . . . New dependability . . . New over-all economy – for slim-hole drilling rigs, workover rigs, well-servicing equipment, booster compressor, pumping and pipeline applications

Extra-heavy counterbalanced crankshaft is dynamically balanced to eliminate harmful vibration. Withstands the high explosive and torsional forces of high-compression, high-speed operation.

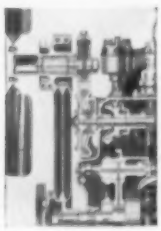
Wet-type cylinder sleeves help keep maintenance costs low. Liners can be replaced at a fraction of the cost of reboring the block.



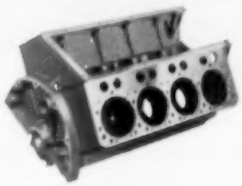
Cam-ground aluminum pistons have full-floating piston pins. They minimize vibration, improve efficiency and maintain correct cylinder-wall contact under all conditions.



Gear-driven water pump provides dependable circulation. Pump-shaft is pressure-lubricated from engine oil supply — no belt loads to cause premature wear.



Box-like crankcase provides extra rigidity to withstand the strains and stresses of rough handling. Also eliminates the need for troublesome seals.



Full-pressure oiling system provides lubrication under pressure to all vital engine parts. Full-flow filter cleans all of the oil.

Today's most advanced, medium-speed, lightweight engine — unbeatable power for all oilfield applications

Here's the big brother to Le Roi's H540, an old oilfield favorite. It's another step forward for Le Roi — another step in Le Roi's never-ending program of designing and building to keep pace with new oilfield demands for more power, more compactness, greater dependability, greater accessibility, greater economy under continuous load.

This new Le Roi has an 844-cubic inch displacement. Its V-8, valve-in-head design offers several advantages: (1) It provides a smooth flow of power throughout a wide range of speeds up to 2,000 rpm. (2) It reduces idle time and labor costs by making periodic maintenance procedure simpler — because of accessibility of accessories. (3) It is designed for compactness and produces 225-hp—that's a lot of power in a small package.

You can equip the H844 to burn natural gas, butane — propane, or gasoline. Either way, you enjoy trouble-free performance and low operating costs. Ask your rig manufacturer, supply house, or Le Roi distributor to show you all the reasons why. See him soon.

LE ROI

LE ROI COMPANY

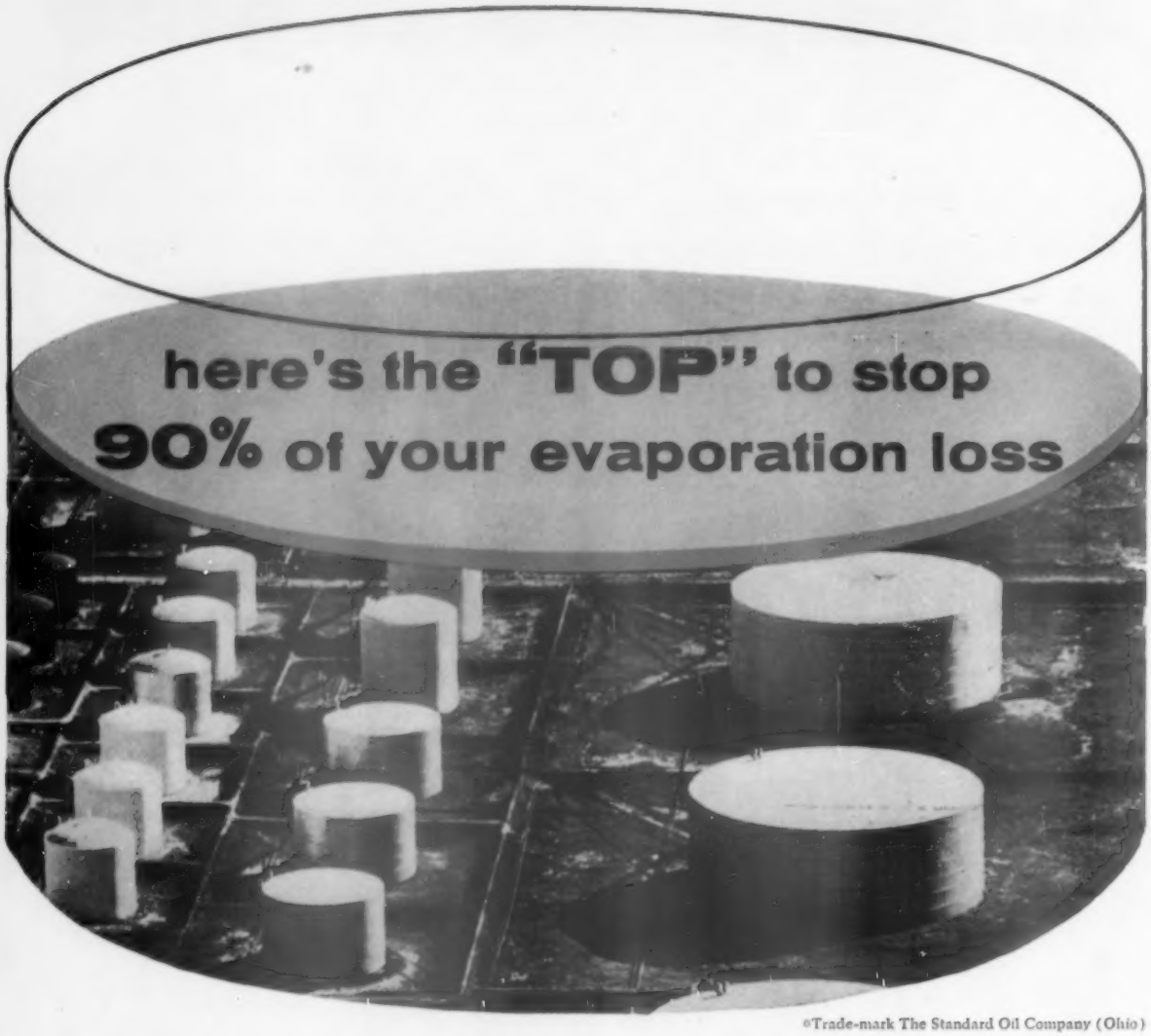
A Subsidiary of Westinghouse Air Brake Co.

MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Mich.

Oilfield Headquarters: Tulsa, Oklahoma

P-127



*Trade-mark The Standard Oil Company (Ohio)

It's a half-inch layer of tiny, hollow Microballoon* spheres of BAKELITE Phenolic Resin that floats on the surface of crude oil. In an 88-ft. diameter tank it can prevent evaporation loss of more than 850 *barrels a year!*

These spheres lock in the original properties of crudes throughout long storage—keeping value up. And you save substantially on installation as compared with other volatile control systems. Initial cost is so low, oil savings alone can write it off in less than a year.

In application, the spheres—resembling reddish-brown flour—are pumped into the tank with the oil. Floating to the surface, they form a blanket that rises and falls with the oil level. It flows around internal supports, keeping the surface sealed as the level changes.

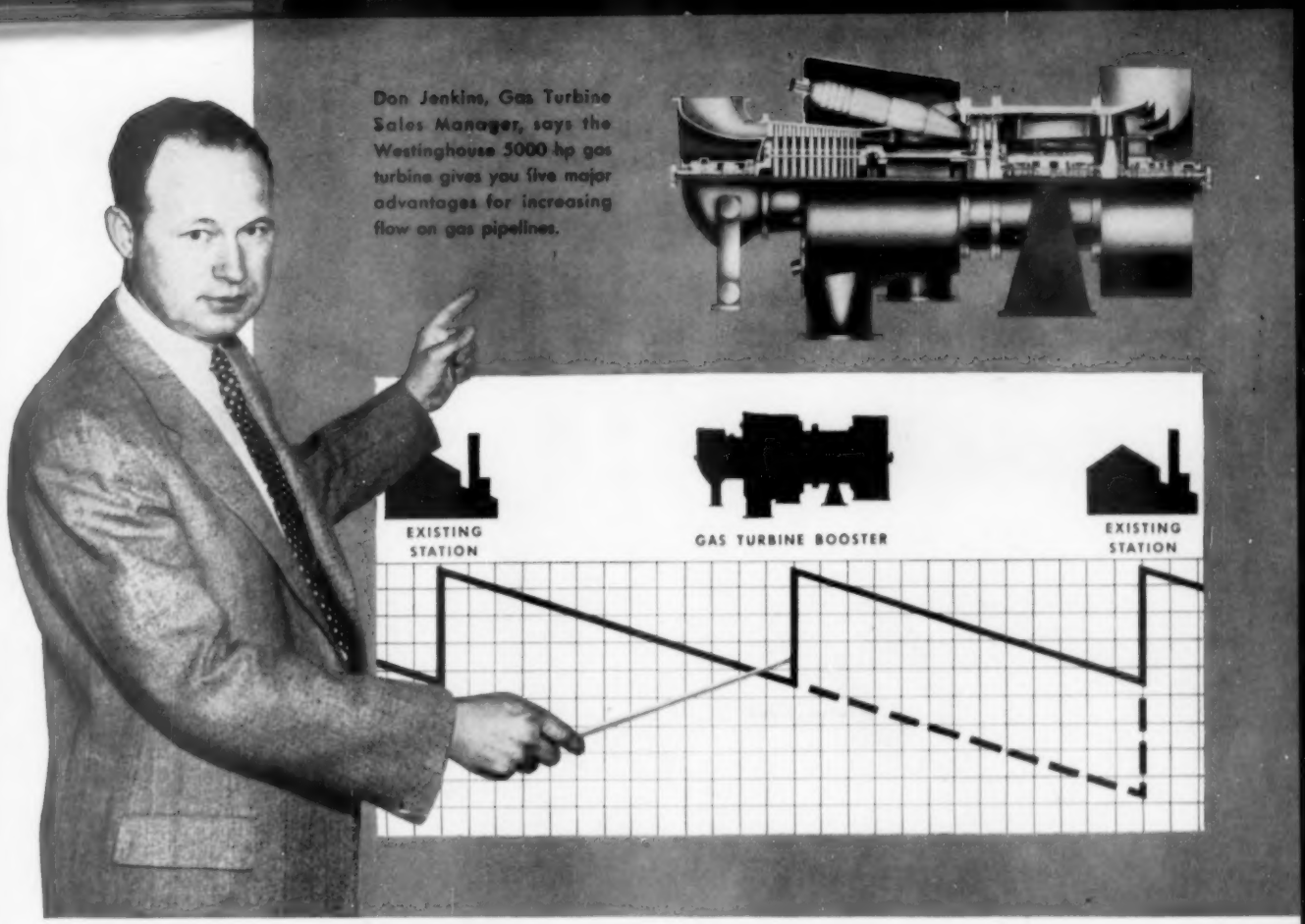
Tests show no deterioration in spheres floating on crude oil for over two years. Their small size and non-abrading qualities prevent damage to pipe lines and precision pumps.

Investigate these spheres for your tank facilities. Write Dept. YD64 for illustrated booklet describing spheres made from BAKELITE Phenolic Resin for oil evaporation control.

BAKELITE
TRADE-MARK
PHENOLIC RESINS

TRADE MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York 17, N. Y.
In Canada: Bakelite Company
Division of Union Carbide Canada Limited
Belleville, Ontario


Don Jenkins, Gas Turbine Sales Manager, says the Westinghouse 5000 hp gas turbine gives you five major advantages for increasing flow on gas pipelines.
EXISTING STATION
GAS TURBINE BOOSTER
EXISTING STATION

WESTINGHOUSE GAS TURBINE BOOSTER STATIONS . . .

Put *all* of your pipeline to work!

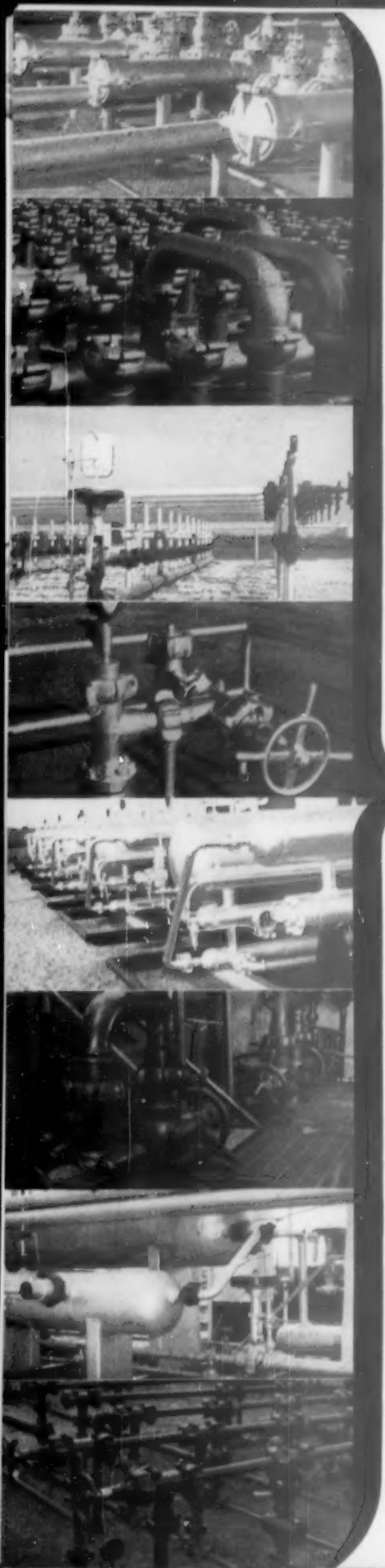
Westinghouse Gas Turbines now make it more *practical* than ever before to add boosters wherever you need them—and do it at *less cost* than other types of drives. Here's why:

- **Lowest installation costs:** Smaller building and lighter foundation than any other drive in widespread use.
- **Lowest operating costs:** A typical two-unit station requires only two men per shift. The simple, clean design has extremely few moving parts—easy to operate, inexpensive to maintain.
- **Extra power:** Up to 25% during cold peak-demand periods . . . more than any other type of drive.
- **No cooling water:** An outstanding advantage of Westinghouse Gas Turbines.
- **Direct connection to centrifugals:** The gas turbine is the *only* drive, using gas directly from the line, that drives centrifugal compressors without step-up gearing . . . an important advantage where the high-flow, low-compression ratio of centrifugals is needed.

Westinghouse Gas Turbines have many more inherent advantages for gas pipeline service. Your Westinghouse Salesman has the full story for you now, in terms of proved performance and sound economics. Call him or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-50568

YOU CAN BE SURE...IF IT'S

Westinghouse



THERE IS ONLY ONE

UNIBOLT

Distinctive features: **Lighter but stronger**—its unique design results in minimum bulk and weight yet places more metal in shear to provide greater strength. **One bolt**—simplifies assembly and disassembly and serves only to draw tapered interlocking shelves together, carrying none of the load of the coupling itself. **Adaptability**—its design readily permits adapting it to numerous fittings, as well as pipe couplings. **Interchangeability**—any part for a given size and type coupling or fitting is interchangeable, permitting minimum warehouse stocks of UNIBOLT products and replacement parts. **Broad field of application**—ALL UNIBOLT products utilize the same basic mechanical design, only the seal rings, or gaskets, differ with the class of service.

THORNHILL UNIBOLT **CRAVER CO.**

P. O. BOX 1184 HOUSTON, TEXAS

OIL MEANS AGRICULTURE

In farming . . . in every basic industry . . . petroleum furnishes the power to keep America the best fed, best clothed and most prosperous Nation in the world's history. In oil production, Schlumberger Casing Perforators . . . both bullet and shaped charge . . . have set a standard of excellence in accuracy, efficiency and safety.

. . . and Schlumberger means Service

Schlumberger Well Surveying Corp. • Houston, Texas

"MURPHY DIESELS are the answer to the driller's problem . . . no repairs . . . a lot of power"

says: James E. Armstrong,
Manager
DRILLING AND PRODUCTION COMPANY
BAKERSFIELD

DRILLING AND PRODUCTION CO.
LOS ANGELES 14, CALIFORNIA
2907 L STREET, BAKERSFIELD
TELEPHONE 8-0955

Glenn Rose Engine Service
502 South Real Road
Bakersfield, California

Gentlemen:

Our Murphy Diesels Model 112 and 122 driving an Oilwell Pump 214P (7-1/4 liners) at 70 to 75 strokes per minute are now over a year old. They have worked in excess of 300, 24 hr. days with no repairs whatsoever. The only parts purchased have been filters and fan belts. The Murphys have a lot of power to spare. Our pressures and volume have been more than satisfactory under the most extreme conditions.

The fuel consumption has never exceeded 17 gallons per hour. Our average consumption of #2 fuel has been 6.6 gallons per hour. The average conditions at 5000' with 7-1/4" liners, are as follows: 850 psi at 63 SPM or 300 hydraulic H.P. We believe Murphy Diesels are the answer to the driller's problems.

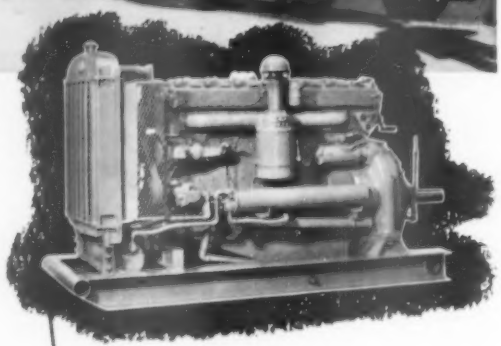
Very truly yours,

DRILLING & PRODUCTION CO.

James E. Armstrong

James E. Armstrong, Manager

JEA:re



• Mr. Armstrong's own words tell far better than we could why so many drillers are turning to Murphy Diesel power. And Mr. Armstrong's words echo the statements of Murphy Diesel users everywhere. Drillers particularly like the dependable, trouble-free service, the freedom from costly downtime and the fuel economy they get from Murphy Diesels. You can put these advantages to work for you. Just call your Murphy Diesel Dealer. He'll give you all the facts.

MURPHY DIESEL COMPANY

5305 W. Burnham St. • Milwaukee 14, Wisconsin

FACTORY BRANCH—Sales, Parts and Service: **113-117 So. Elwood St., Tulsa, Oklahoma**

Engines and power units 90 to 260 H.P.; dual-fuel engines, 135 to 215 H.P.

303

MURPHY DIESEL

SEE YOUR MURPHY DIESEL DEALER, TODAY—

ALBUQUERQUE, NEW MEXICO, Lively Equipment Company; BUTTE, MONTANA, Hall-Perry Machinery Company; CORPUS CHRISTI, TEXAS, Houston Engine & Pump Company; DALLAS, TEXAS, Conley-Lott-Nichols Machinery Co.; DENVER, COLORADO, Power Equipment Company; EDMONTON, ALBERTA, CANADA, Northern Engine & Equipment Co., Ltd.; GREAT BEND, KANSAS, Manufacturers Dist. Co.; GREAT FALLS, MONTANA, Hall-Perry Machinery Company; HOUSTON, TEXAS, Houston Engine & Pump Co., Inc.; JACKSON MICHIGAN, Utility & Industrial Supply Co.; LOS ANGELES, CALIFORNIA, Industrial Engine Service; LUBBOCK, TEXAS, Conley-Lott-Nichols Machinery Co.; SAN ANTONIO, TEXAS, The Roy Klossner Company; BAKERSFIELD, CALIFORNIA, Glenn Rose Engine Service; ODESSA, TEXAS, Conley-Lott-Nichols Machinery Co.; LONGVIEW, TEXAS, Nichols Machinery Co.
TULSA, OKLAHOMA, SALES, PARTS AND SERVICE.

A Service

that knows no boundaries

From Alaska to Zamboanga and points North, East, South and West, wherever man has a need for water—there you will find Layne.

It's a typical American success story—this history that spans nearly three quarters of a century and started with a one man muscle power drilling rig—and an idea.

Today Layne is the name of a product—but it's more than that—much more. The name Layne is also the name of a service, international in scope, that includes every phase of ground water development from preliminary exploration to maintenance of installed equipment.

Where industry—agriculture—municipality—has any problem that relates to water, there is one organization that offers unbiased authoritative advice—plus the "know how" to solve the problem and keep it solved.

For information on any phase of ground water development, modernization, maintenance or equipment consult your nearest Layne Associate Company—or write

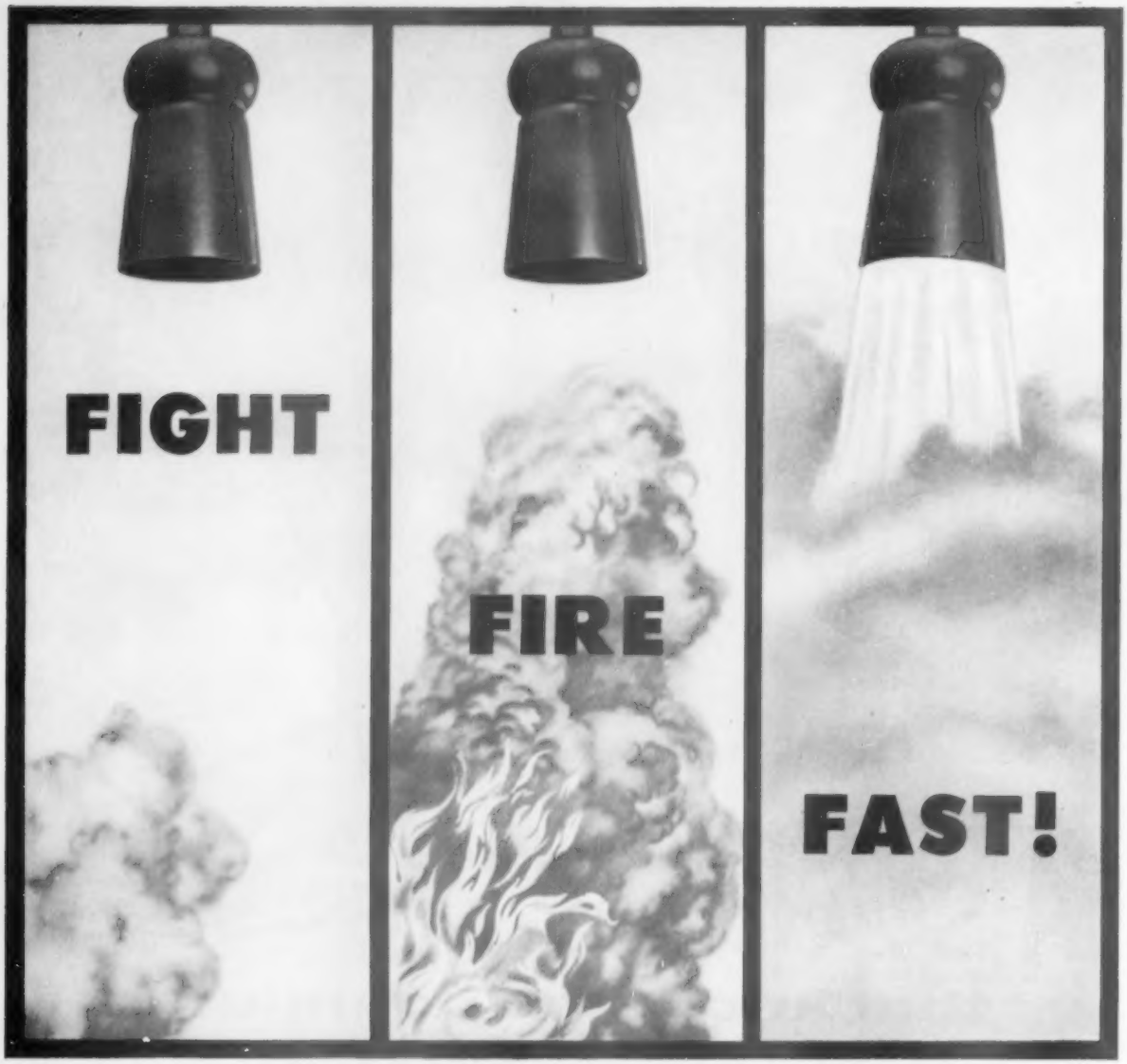
LAYNE & BOWLER, INC.
Memphis 8, Tennessee, U.S.A.

Layne Associate Companies Throughout the World

Layne

▪ An informative booklet "Bulletin No. 100" will be sent free upon request.

Water Wells • Vertical Turbine Pumps • Water Treatment



WITH A KIDDE CO_2 SYSTEM!

Let fire get a foothold, and a going concern is *gone*. Don't risk it. Install a Kidde Automatic CO_2 Fire Extinguishing System, and fire won't stand a chance.

A Kidde System goes into action at the first sign of fire—releases clouds of CO_2 over the blaze, smothers fire almost as soon as it starts. And CO_2 leaves no mess to clean up later. It puts out the fire, then vanishes.

Protect flammable liquids, machinery and electrical equipment with a Kidde System.

And for on-the-spot protection, get Kidde portables. When fire strikes, just aim the horn, pull the trigger, and *swoosh!* No more fire.

Don't wait 'til your business is a cinder pile—Contact Kidde today.

Kidde

The words "Kidde", "Lux", "Lux-O-Matic" "Tyro-Freez" and the Kidde seal are trademarks of Walter Kidde & Company, Inc.

Walter Kidde & Company, Inc.
854 Main Street, Belleville 9, New Jersey
Walter Kidde & Company of Canada, Ltd., Montreal—Toronto

They Say—

'Intersectional Extortion'

"We believe today's order is as distasteful to the men on the Federal Power Commission as it is bitter to the gas producers. They are having to carry out the shocking philosophy of our Supreme Court as expressed in the Phillips case.

"The result is that intersectional extortion has been legalized and put in official decree with today's order. Private property in one section of America is being socialized for the benefit of voting masses in another section.

"Invasion of private property rights and federal control of one of Texas' chief natural resources is no longer an academic question. Our conservation authorities, state lawmakers, independent producers, and landowners are now face-to-face with the issue of federal control.

"Our only hope is that Congress will be sufficiently outraged to remedy this situation."

Harry W. Bass, president of Texas Mid-Continent Oil and Gas Association, in a statement issued following the FPC freeze on natural-gas prices.

It's Canada's Fault

"We in Canada must now, whether we like it or not, accept a major part of the blame for the rejection (of importing Canadian natural gas into the United States).

"It was primarily because of circumstances of our own making that the U. S. Federal Power Commission saw fit to pick a less economic project in preference to one which would have involved Canadian gas."

Carl Nickle, publisher of Daily Oil Bulletin and a member of the Canadian Parliament, in a speech before the Calgary Kiwanis club.

Industry Supporter

"Competition among the gasoline marketers is the chief spur behind the 'souped-up' gasoline project. The trend reflects the oil industry's swing from a seller's to a buyer's market. With gasoline in abundant supply and price wars frequently breaking out, competition is keener than at any time since before World War II.

"To the credit of those who manage the oil companies, they are trying to meet this situation by sinking millions

For Temperature Control

$35 Nicholson Trap Replaces $200 Unit

Again demonstrating their remarkable effectiveness as a low-cost temperature control, a large processor reports Nicholson expansion steam traps, at about $35 each, are being installed on outdoor tanks and stills in place of temperature controls. These were costing $110.00 to $200.00, with cost of trap added.

The Nicholson traps are readily adjusted to pass condensate at any temperature below 212°F. No air binding. Lengths 9" to 40". Easily installed, usually without supports. Pressure, 0 to 250 lbs.

For All Equipment Using Steam or Hot Water

Dryers, Evaporators, Heat Exchangers, Heaters, Kettles, Paper Machinery, Pipe Coils, Radiators, Retorts, Separators, Steam Stills, Storage Tanks

CATALOG 953

210 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

REED TRADEMARK

Announces . . .

. . a revolutionary

New HINGED PIPE CUTTER

You can cut off 8" pipe, in less than 5 minutes

send for free literature on these amazing cutters for standard steel and cast iron pipe from 2½" to 12".

MAIL THIS COUPON TODAY

REED MANUFACTURING CO.
ERIE, PA.

Without obligation, please send me descriptive literature on your new hinged pipe cutters.

Name _____

Company _____

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City _____ State _____

Where Mission makes the difference

Notice the small groove in the Mission Piston body flange? Here's where Mission makes another major difference! This groove, which is carefully and accurately machined to tolerances of 1/10,000 of an inch, functions as a built-in wear gage.* When after long use the flange of the piston body is worn to the bottom of the wear groove in any spot around the circumference, it is time to replace the piston body. Until the wear groove indicates optimum use has been obtained, you simply replace the long-life rubbers and save the piston body, thus reducing piston replacement costs substantially. This "little extra" in the Mission Piston design was originated by Mission to help you get longer and better service life.

Specify Mission Pistons to your supply store. No other piston gives you the extra Mission quality that results in longer, trouble-free service before requiring attention—and costs less to renew when finally worn.

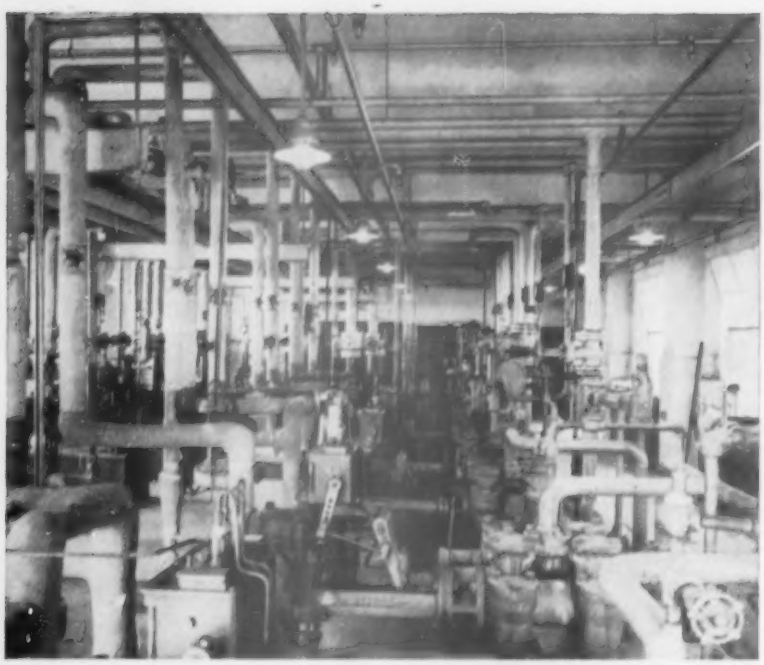
*Patent Pending

Nothing but the finest will ever bear the name of

MISSION
MANUFACTURING CO.

P. O. BOX 4209 • HOUSTON, TEXAS

Export Office: 30 Rockefeller Plaza, New York



ENGINEERED PROTECTION

To Lick Fire—Maintain Profits!

Close inspection reveals much more than meets the eye in this petroleum refinery pump room. "Automatic" FIRE-FOG protection, ENGINEERED to this specific risk, is ready at all times to detect and extinguish fire, should it threaten to destroy property, halt production, reduce profits.

This is but one type of a wide variety of fire-fighting systems designed, manufactured and installed by "Automatic" Sprinkler Corp. of America. Others employing AIR FOAM, high or low pressure CO_2, Dry Powder, etc. stand guard over scores of petroleum and petro-chemical properties throughout the world.

The time to plan ENGINEERED "Automatic" FIRE PROTECTION is **before** fire strikes—not **after** fire has destroyed. Contact your nearest "Automatic" Sprinkler fire protection engineer for an appointment with a Safety First future. He'll gladly prepare a fire protection analysis for you without cost or obligation.

"Automatic" Sprinkler
CORPORATION OF AMERICA
YOUNGSTOWN, OHIO

Offices in Principal Cities of North and South America

into research and hundreds of millions into new refining equipment. Their purposes—to improve the quality and sales appeal of their product and to increase the proportion of gasoline that can be extracted from the crude oil—are certainly laudable from the public viewpoint."

Editorial in the International Falls, Minn., Daily Journal.

Texaco and Depletion

". . . Exploring for oil, always tremendously expensive, is increasing in cost every year. Without the incentive and capital recovery provided by the depletion allowance, many companies and individuals would be unable to continue oil exploration and drilling. Our domestic oil reserves would diminish with resulting harm to our entire economy.

"Our way of life today is increasingly dependent upon an abundant supply of oil. Oil consumption in the United States has increased more than 257 per cent since 1926 . . . Since that time, with the 27½ per cent depletion allowance . . . the American oil industry has continued its dynamic growth and today our known oil and gas reserves in the ground are 229 per cent more than they were in 1926.

". . . Evidence is abundantly available to support the contention that any smaller allowance would discourage independent drillers and major oil companies alike from taking the calculated risk so necessary to providing adequate oil supply—not only for today, but for a decade hence . . ."

Remarks made to stockholders and employes of The Texas Co. in a quarterly report from J. S. Leach, chairman of the board, and Augustus C. Long, president.

Petrochemistry Growing Fast

"Companies which are major producers of petrochemicals have become favorites for investors. The growth potential associated with the chemical industry is largely centered in petrochemicals. Most petrochemicals are based on ethylene . . . one way to show the growth is to look at ethylene production. Production of ethylene was 3 billion pounds in 1940 . . . 15 billion in 1950, and almost 18 billion in 1953. A growth curve through this data indicates about 36 billion pounds by 1960, a 100 per cent increase in 6 years.

"Whereas all U. S. industry is currently growing in the neighborhood of 2 per cent a year, based on the Federal Reserve Index of Industrial Production, the chemical component of the Federal Reserve Index shows an average rate

When you need... VERSATILE ...RELIABLE ...Low Cost Boat Power

EVINRUDE
OUTBOARD MOTORS

LOOK SHARP at the savings when you power *any* type of boat with an Evinrude instead of an inboard engine. *Low initial cost* . . . and that cost is *all!* No expensive installation work—no accessories—no "extras"—all of which can easily total more than the original engine cost.

More important, look at the *advantages.* Complete portability. Motors can instantly be transferred from boat to boat. No sacrifice of hull space. Utmost simplicity of operation and servicing. Safe and efficient running in shoalest waters. Complete maneuverability with gearshift which provides Neutral, Forward, Reverse.

Wherever power requirements are under 30 H.P., Evinrudes are the logical choice. For literature describing the complete Evinrude line, write EVINRUDE MOTORS, Dept. C, 4480 N. 27th St., Milwaukee 16, Wis.

In Canada: Manufactured by Evinrude Motors, Peterborough, Ontario.

26-ft. waterfront work boat employed in ferrying and general utility service. Carrying capacity up to 8 tons. Speed, to 15 m.p.h. with 25 H.P. Evinrude, depending on load. An exceptionally capable and useful craft.

HENRY H. PARIS — Manufacturer's Agent - Oil Well — P. O. BOX 932 — HOUSTON, TEXAS

DISTRIBUTOR Inc. — and Refinery Supplies — 1125 ROTHWELL ST.

Agent and Distributor for the following Nationally Known Manufacturers:

ALTEN FOUNDRY & MACHINE WORKS
Lancaster, Ohio
Pumping Units, Jacks & Surface Equipment.

THE OHIO INJECTOR COMPANY
Wadsworth, Ohio
OIC Valves, Bronze, Iron, Cast and Forged Steel for all purposes.

DRESSER MANUFACTURING DIV.
Bradford, Pa.
Seamless Welding Fittings.

OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types OIL COUNTRY BOILERS.

THE GORMAN-RUPP COMPANY
Mansfield, Ohio
Centrifugal Pumps.

STEEL FORGINGS, Inc.
Shreveport, La.
Weld Saddles.

HARRISBURG STEEL CORPORATION
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

VOLCANO BURNER COMPANY
Houston, Texas
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

LOS ANGELES BOILER WORKS
Los Angeles, California
Welding Caps—Dished & Flanged Heads.

WESTERN SAFETY BARREL STAND
Houston, Texas
Stand lifts, holds, tilts 55 gal. barrels Prevents spillage—easily loaded.

MILLS IRON WORKS, INC.
Los Angeles, Calif.
Seamless Swage Nipples, Bull Plugs & Welding Reducers.

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

of growth of about 6 per cent a year—but ethylene consumption shows an average current rate of growth of about 10 per cent a year."

Lewis E. Lloyd, economist, Dow Chemical Co., in an address in Chicago before the National Federation of Financial Analysts Societies convention.

Iran Acted Wisely

"The free world is fortunate that Russia has not tried to step in and capture the oil resource (of Iran) . . . The Kremlin has made internal trouble in Iran, but apparently has been too busy with other aggressions to send an army into Iran . . .

"Now that the Iran oil production will be by a consortium of eight companies invited in by the government . . . it will be harder for Red politicians to make capital of this issue. Iran must have tax money from her oil to survive as an independent nation. The only way she can obtain that is to have foreigners do the producing. She has acted wisely in having this done by capitalist companies rather than by the Russian Government."

Editorial in the Dallas Morning News.

CALENDAR OF EVENTS

AUGUST

13 Southern Gas Association, pipeline operations and engineering conference, Rice Hotel, Houston.

16-17 North Dakota Oil and Gas Association, second annual convention, Bismarck, N. D.

16-18 Society of Automotive Engineers, West Coast annual meeting, Statler Hotel, Los Angeles.

20 Southern Gas Association, conferences on natural-gas gathering and natural-gas processing, Captain Shreve Hotel, Shreveport.

20-21 Southern Gas Association, natural-gas processing and pipeline operations conference, Herring Hotel, Amarillo, Texas

23-25 Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

26-28 (tentative) Intermountain Association of Petroleum Geologists, fifth annual field conference, beginning at Price, Utah.

27-28 Joint meeting, reserves committees of A.G.A., A.P.I., Canadian Petroleum Association, Banff, Canada.

SEPTEMBER

6-11 American Chemical Society, national meeting, Conrad Hilton Hotel, Chicago

7-9 Association of Desk and Derrick Clubs of North America, annual convention, Banff Springs Hotel, Banff, Alta.

8-10 Pacific Coast Gas Association, sixty-

Magcobar

Regardless of the "brand" of mud you used on your last well, Magcobar contributed to the fact that **you paid about 15% less for it than you would have in 1941.** That's astounding, isn't it—especially in view of the fact that the average total drilling cost for services and equipment other than drilling mud has increased approximately 65% since 1941. Yes, 1941 was the year Magcobar entered the drilling mud picture and established fair and reasonable prices, highest quality products and good service. These three things are the foundation upon which Magcobar has been built.

Every year since 1941, Magcobar has continued to improve and add new products, multiply many-fold its mining and processing plants, establish more dealers and increase the number of mud engineers in the field.

Look for the Magcobar Dealer sign the next time you need mud. You can be sure of the quality at fair and reasonable prices when it's in the Magcobar bag.

MAGNET COVE BARIUM CORPORATION
HOUSTON, TEXAS
ONE OF THE DRESSER INDUSTRIES

Follow this line

to New Savings

The OXWELD Automatic Tracer is an accurate, economical motive power unit for oxygen-cutting machines. It is easy to set up and operate. No special tools are needed for templet cutting—they can be cut from VINYLITE plastic sheets with a knife or shears.

With an OXWELD Automatic Tracer

Trade-Mark

MAKES OXYGEN-CUTTING FAST, EASY and ACCURATE

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first annual meeting, Vancouver Hotel, Vancouver, B. C.

9-11 Billings Geological Society, annual field conference, Billings, Mont.

9-11 Interstate Oil Compact Commission, Omaha, Neb.

10 Southern Gas Association, conference on compressor-station operation, Jung Hotel, New Orleans.

12-16 American Institute of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.

13-14 Independent Natural Gas Association of America, annual meeting, Roosevelt Hotel, New Orleans.

14-15 National Association of Corrosion Engineers, South Central region, Dallas.

15-16 American Gas Association, sixth annual accident-prevention conference, Bond Hotel, Hartford, Conn.

15-17 American Petroleum Institute, lubrication committee, Traymore Hotel, Atlantic City, N. J.

15-17 National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.

16-17 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

17 Natural Gasoline Association of America, Oklahoma regional meeting, Skirvin Hotel, Oklahoma City.

23-24 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.

25-27 Diesel and Gas Engine Power Plant Operators Conference, sixth annual conference, Oklahoma A. & M. College, Stillwater, Okla.

27-28 Symposium on Methods for Testing Liquefied Petroleum Gases (ASTM D-2; ASTM D-3, CNGA & NGAA), Statler Hotel, St. Louis.

27-29 Electrical Conference for Petroleum Industry, American Institute of Electrical Engineers, Mayo Hotel, Tulsa.

27-30 Ninth Annual Petroleum Mechanical Engineering Conference, petroleum division of the American Society of Mechanical Engineers, Statler Hotel, Los Angeles.

28-29 Texas Mid-Continent Oil and Gas Association, Baker Hotel, Dallas, Tex.

30 Southern Gas Assoication, conference on transmission management, Shamrock Hotel, Houston.

OCTOBER

1 Southern Gas Association, conference on gas pipeline rights-of-way, Rice Hotel, Houston.

1-2 Standards Engineers Society, annual meeting, Haddon Hall, Atlantic City, N. J.

3-7 ASTM Committee D-2 on Petroleum Products and Lubricants, Sheraton Park Hotel, Washington, D. C.

4-6 Texas Mid-Continent Oil and Gas Association, annual meeting, Plaza Hotel, San Antonio, Tex.

4-6 Petroleum Electric Power Association, twenty-sixth anniversary meeting, Jung Hotel, New Orleans.

5-7 American Institute of Electrical Engineers, Middle Eastern district, Abraham Lincoln Hotel, Reading, Pa.

6-8 Eighteenth Technical Conference on Petroleum Production, Pennsylvania State University, State College, Pa.

7-8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.

7-8 American Institute of Mining and Metallurgical Engineers, Pacific Petroleum chapter, fall meeting, Biltmore Hotel, Los Angeles.

10-13 American Association of Oilwell Drill-

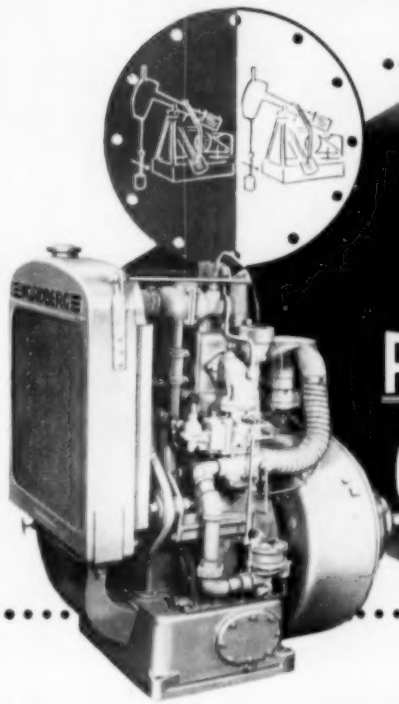
ready for 'round-the-clock
PRODUCTION PUMPING

...dependable

NORDBERG

POWER CHIEF

GAS ENGINE



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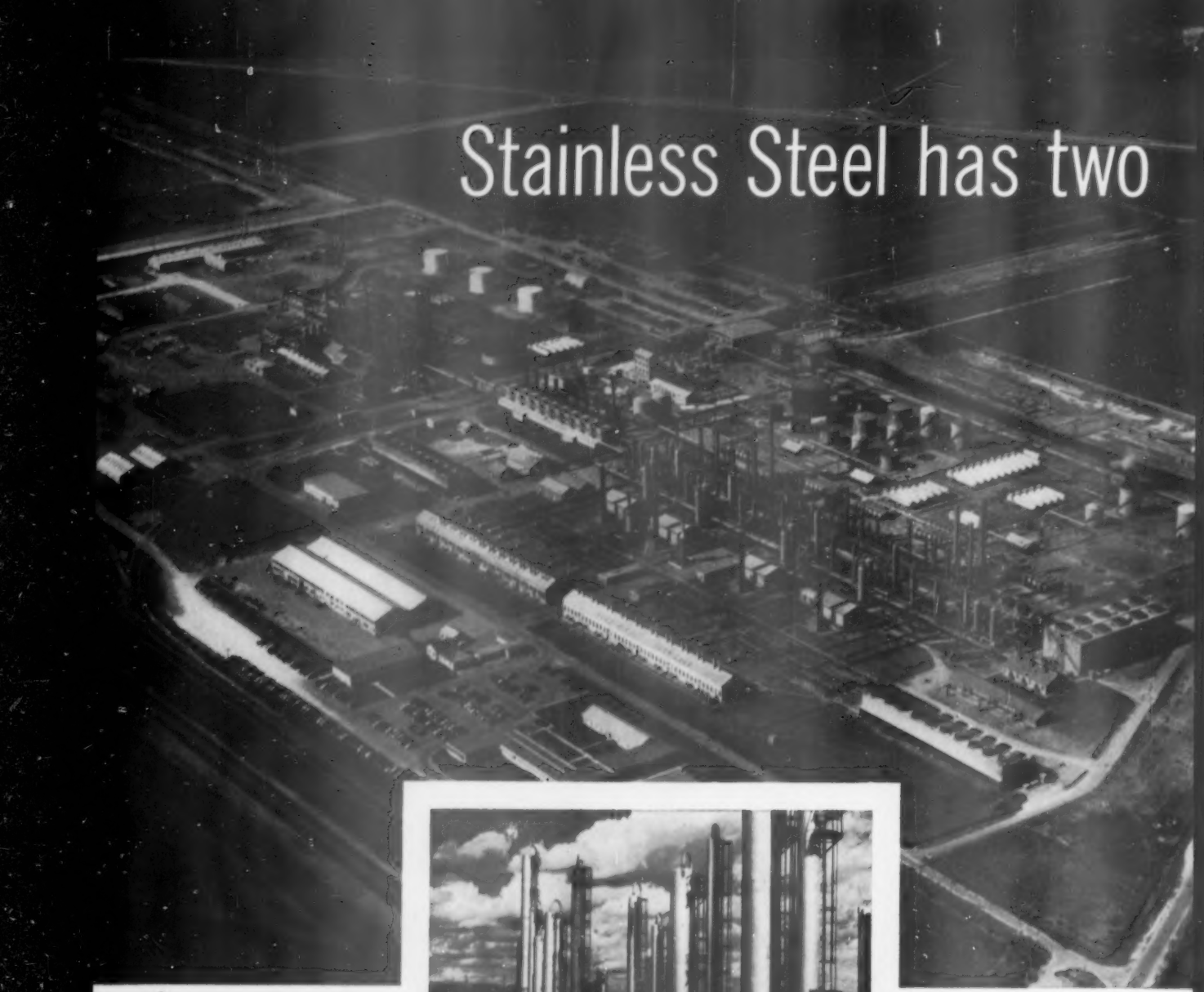
4-254-G

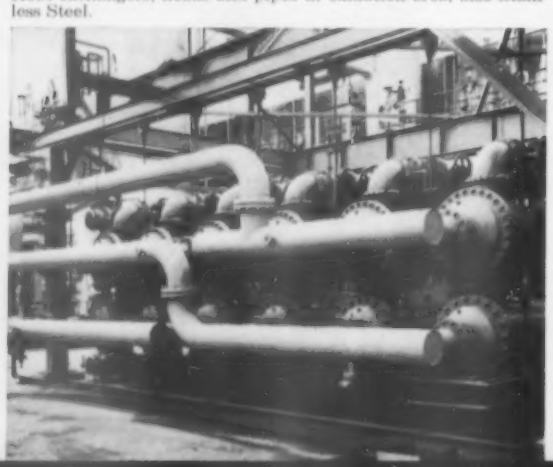
Stainless Steel has two



▲ Aerial view of Celanese Corporation of America's Chemcel Plant at Bishop, Texas.

▼ Fractionation tower in the oxidation area is Stainless Steel as are its internals.

▼ Heat exchangers, heads and pipes in oxidation area, also Stainless Steel.



◀ In the acetic acid unit, most towers, tower internals and heat exchangers are Stainless Steel.

▼ Formaldehyde unit at the Chemcel Plant, with towers and internals of Stainless Steel.

big jobs in this plant

. . . RESISTING CORROSION'S ATTACK

. . . PROTECTING PRODUCT PURITY

THIS is the Chemcel Plant of Celanese Corporation of America at Bishop, Texas. Like so many other plants of its nature, it depends heavily on Stainless Steel to keep its operations continually on stream.

The fractionation tower and its internals, located in the oxidation area, are made of Stainless Steel. So are the heat exchangers, heads and pipes in this same reaction area.

Similar applications of Stainless Steel are located in the secondary oxidation or acetic acid unit and in the formaldehyde unit.

In each case, Stainless Steel is doing a dual job. It is used to withstand the attack of the highly corrosive products being handled, and it safeguards the purity of the chemicals being processed.

Along with these primary advantages of Stainless Steel in petrochemical processing go lower maintenance and replacement costs due to Stainless Steel's durability and long life. It will pay you to put Stainless Steel's benefits to work for you, and when you do be sure it is perfected service-tested USS Stainless Steel.

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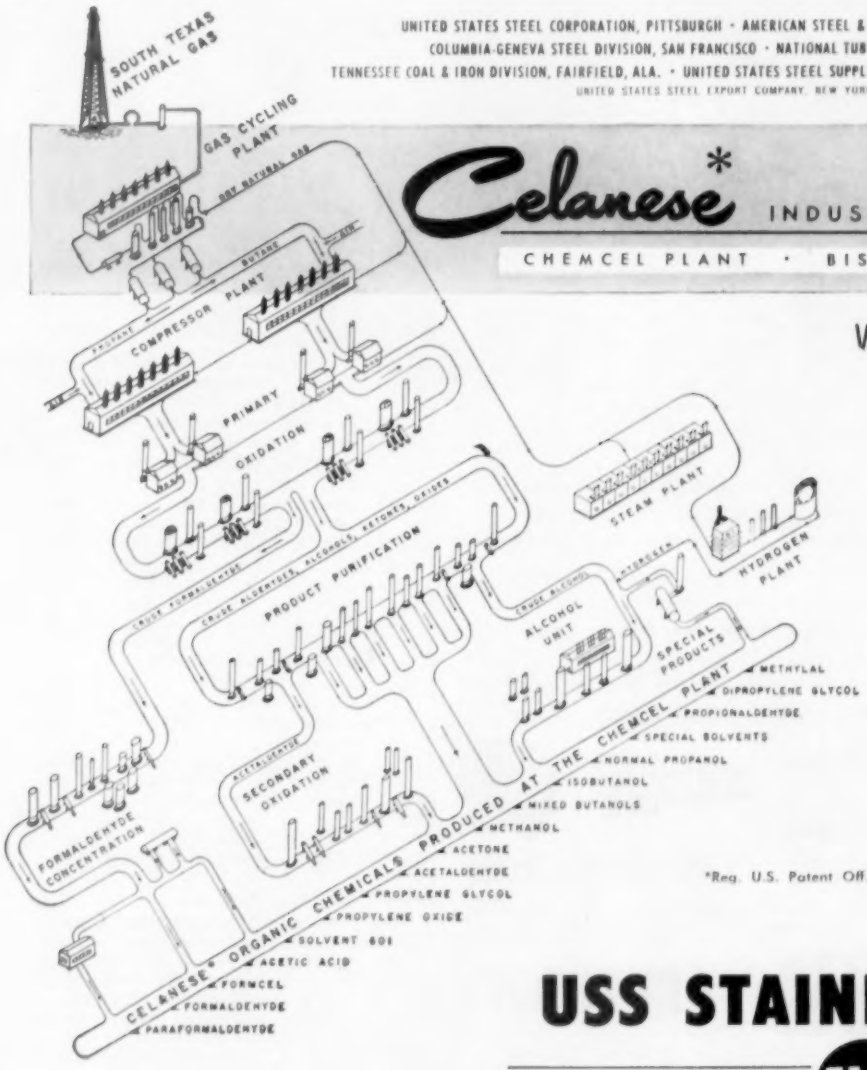

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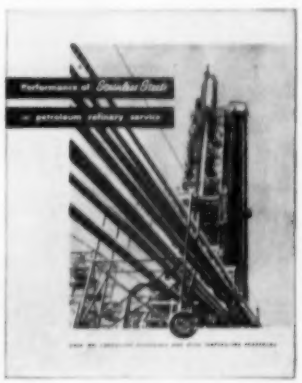

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UNITED STATES STEEL

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the DRESSER way
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You'll find plenty of uses for Dresser Couplings and Long Sleeves around a drilling rig . . . or anywhere else you're joining pipe.

No pipe threading is necessary and the only tool you need is a wrench. Dresser Couplings are that simple to make up. You get a permanent bottle-tight connection every time—even on offset or deflected pipe.

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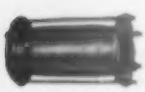
Style 38 Coupling



Style 40 Long Sleeve

Hydrepair* Asbestos Cement Pipe Clamp

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ing Contractors, fourteenth annual meeting, Biltmore Hotel, Los Angeles.

10-16 Oil Progress Week.

11-13 American Gas Association, annual convention, Atlantic City, N. J.

11-17 Permian Basin Oil Show, Odessa, Texas

12-15 Eighth National Chemical Exposition, Chicago Coliseum, Chicago.

14-17 Permian Basin Oil Show, Odessa, Tex.

17-20 American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.

18-19 Joint Lubrication Conference, American Society of Mechanical Engineers and American Society of Lubrication Engineers, Lord Baltimore Hotel, Baltimore.

21-22 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.

24-26 Independent Petroleum Association of America, annual membership meeting, Mayo Hotel, Tulsa.

25-27 National Lubricating Grease Institute, annual meeting, Mark Hopkins Hotel, San Francisco.

26-28 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.

29 Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.

NOVEMBER

1-3 Geological Society of America, annual meeting, Statler Hotel, Los Angeles.

3-5 Gulf Coast Association of Geological Societies, fourth annual meeting, Rice Hotel, Houston.

4 American Association of Oilwell Drilling Contractors, third annual South Louisiana safety clinic, New Iberia, La.

4-5 Society of Automotive Engineers, national fuels and lubricants meeting Mayo Hotel, Tulsa.

5 Southern Gas Association, conference on field production of natural gas, Herring Hotel, Amarillo.

8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

11-12 American Association of Petroleum Geologists, Pacific section annual meeting, Biltmore Hotel, Los Angeles.

17-18 North Texas Section, American Institute of Mining and Metallurgical Engineers, and Production Committee of the North Texas Oil and Gas Association, symposium on secondary recovery, Wichita Falls, Tex.

18-19 National Association of Corrosion Engineers, fourth annual conference of western region, Hotel Biltmore, Los Angeles.

18-19 Society of Exploration Geophysicists, eighth annual midwestern meeting, Adolphus Hotel, Dallas.

28-Dec. 3 American Society of Mechanical Engineers, Statler Hotel, New York.

DECEMBER

2-4 Interstate Oil Compact Commission, winter meeting, Drake Hotel, Chicago.

2-4 American Chemical Society, Southwest Regional meeting, Fort Worth, Tex.

3 Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex.

12-15 American Institute of Chemical Engineers, annual meeting, Statler Hotel, New York.

two-way abilities

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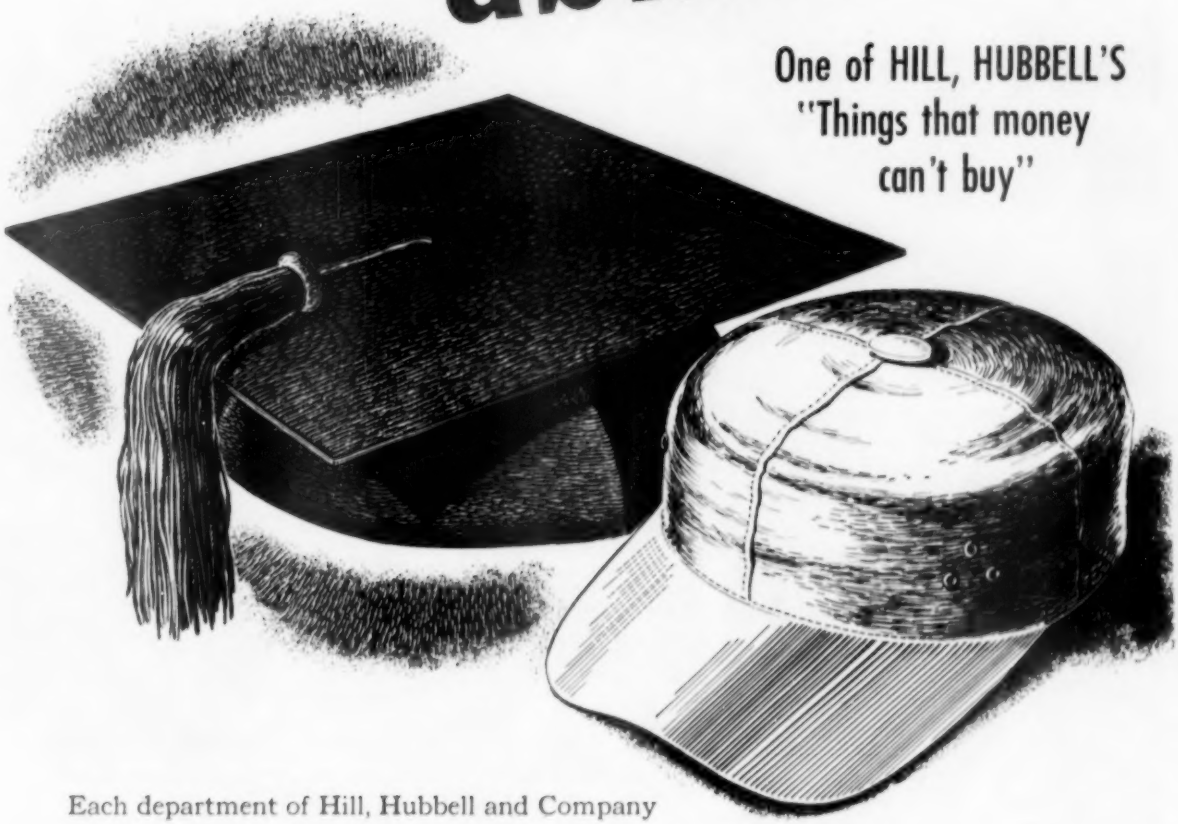

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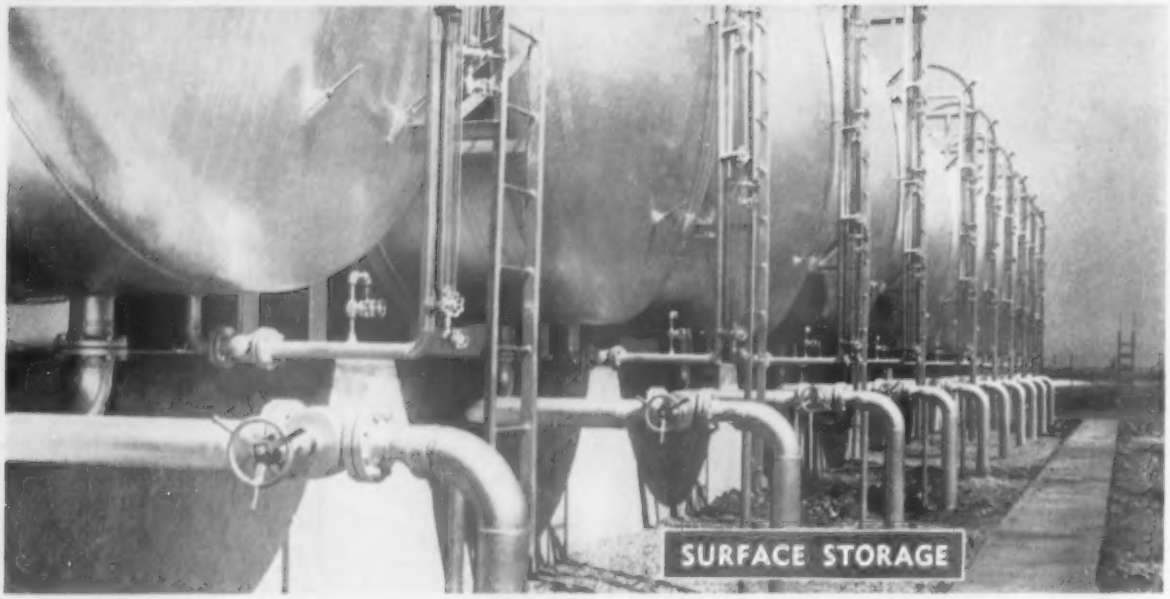

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THE OIL AND GAS
JOURNAL

TULSA, OKLAHOMA

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JOURNALLY Speaking

Green Eyes

WHILE the man with two first names is on vacation, a few of the other editors are having a crack at his column. This is the only place in the Big Yellow Book where anything (almost) goes; as a consequence, all of us live in green-eyed envy of Henry Ralph for 49 weeks a year. To fill in for him while he is in the land of mañana is a right welcome chore.

Ambassador Sans Petroleo

Oil men have a real ambassador in Sicily. A speech delivered before the Palermo Chamber of Commerce by a California-trained engineer, Cesare Carminiani by name, contains some rather extraordinary comments on the American way of finding oil. His observations also spotlight the importance of the independent oil finder, and they pinpoint pretty well the essence of the U. S. record of success.

"In order to have fruitful exploration," Señor Carminiani cautioned, "it is not sufficient to drill **many** wildcats . . . it is necessary that they be drilled by many different **people.** It is not well known that oil exploration, although employing methods based on the principles of the exact sciences, is not scientific in a strict sense. In these explorations there often occurs that which happens in the field of medicine where often two doctors, even with the same technical data . . . elaborate two completely different diagnoses. Likewise two groups of geologists and geophysicists, even starting from identical technical data, often arrive at diametrically opposed conclusions."

Turning from exploration theory to a few political digs, the señor scores some telling points:

"A very clamorous case is offered by Russia that although it contains an area of oil larger than the U. S., it is producing only 45 million tons yearly, as compared to the 330 million of the U. S. Why does this happen? Perhaps because the Russian geologists are less capable than the American ones?

"Not at all. When a great Russian geologist who is the head of the exploration concludes that no oil can be found in that section, nobody can prove him to be wrong by drilling those wells he did not want to drill. Such a thing, instead, happens every day in America on the part of even unknown geologists and often on lands that were condemned as unproductive by the great experts."

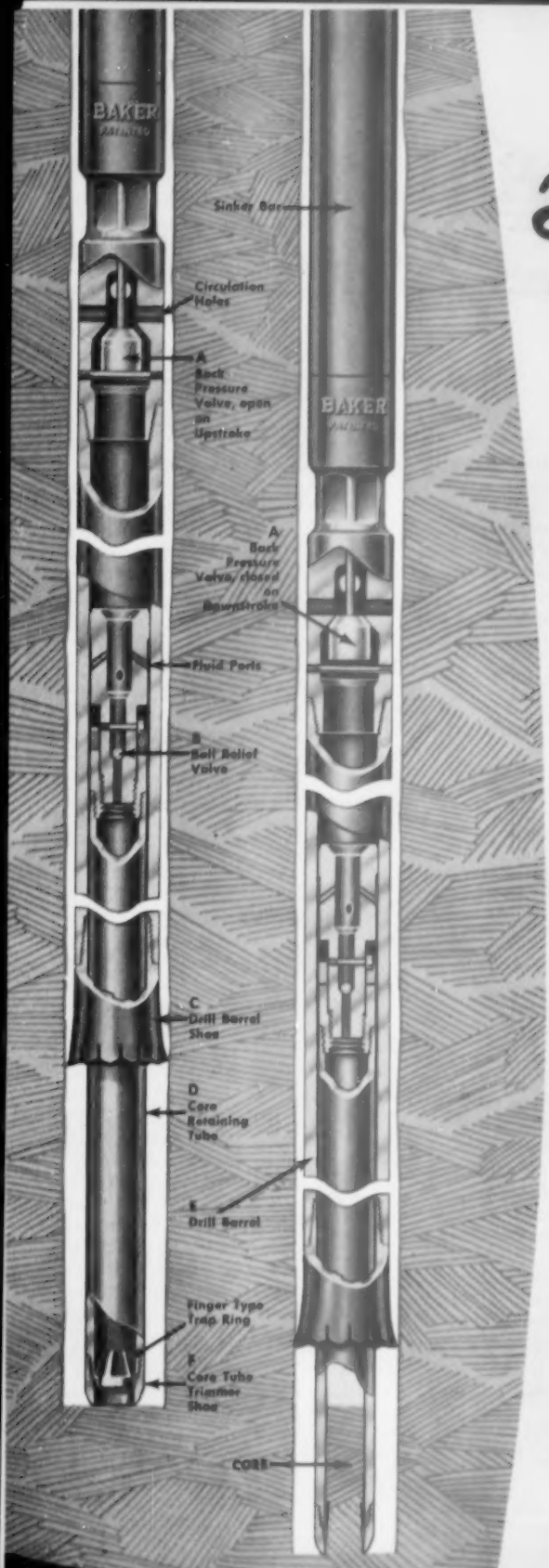
Concluding with a plea to encourage the Americans to enter Sicily to drill and to develop its oil, Carminiani advises his brothers with the sagest remark of all: "For love of country let us not lose sight of what we stand to gain by thinking only of what they stand to profit."

Gadgets Plus Guts

IN the course of an oilversation last week, a geologist friend, obviously irritated with his boss and a succession of dusty diggings, remarked on the recent series of comments in this column re geologists versus doodlebuggers. "Why don'tcha tell 'em sometime in that column of yours that we really don't know a piddling thing about what's down there? Why don'tcha point out in print that all the fields that really amount to something were found by the Dad Joiners of the world? All they had was hope and a hunch—no gadgets, no gimmicks, just guts! Why don'tcha tell 'em that, hey?"

Well, we don't mind "tellin' 'em," but we've got a feeling that if we'd relied on the hunch players and oil feelers all these years, there'd be quite a bit less oil on the books and a lot less money to pay the likes of our friend his daily keep. If he went deep enough (no pun there), we believe he'd discover that, while the independent operator finds a lot of fields, he's using the gadgets these days to do it. Gadgets plus guts equal gushers.

Frank J. Gardner



attention!

CABLE TOOL OPERATORS

WHEN YOU WANT CORES that are a true, uncontaminated, maximum size sample of the formation, at low cost, nothing can equal the BAKER CABLE TOOL CORE BARREL.

This efficient coring device not only meets the requirements of the geologist, but also is extremely popular with both operator and crew because of its simplicity of operation, and its "holemaking" ability. There are no complicated adjustments, and any experienced cable tool driller can *secure good cores* and *maximum footage right from the start.*

Coring with a Baker Cable Tool Core Barrel is extremely economical, with operating and maintenance costs held to a minimum. With proper care, this Core Barrel will last indefinitely, and replacement or re-building of the few wearing parts is necessary only after prolonged service.

Advantages of Coring with the Baker Cable Tool Core Barrel

Cores up to $2\frac{13}{16}$" in diameter, and up to 7 feet in length are readily taken from a wide variety of formations.
The accurate, uncontaminated cores eliminate danger of passing through low-pressure sands that might prove productive.
Tests for porosity, saturation and permeability can be made without difficulty, and *positive proof* of the *exact character* of any sand is ensured. And all of these advantages are secured with little loss of drilling time, as a Baker Cable Tool Core Barrel takes perfect cores at a speed comparable with straight drilling.

Strong and Long Lasting—Easy to Operate

The sturdy construction consists of an outer Drill Barrel (E) and an inner Core Retaining Tube (D). The Trimmer Shoe (F) remains in contact with the formation until the core is taken, after which the entire Core Barrel (with core intact) is removed from the well.
The Drill Barrel (E) slides along the Core Retaining Tube (D) and cuts away the formation, thus permitting the Core Retaining Tube to follow down over the undisturbed core and secure a true sample of the formation.

Features which assist in taking good cores include: the Ball Check Valve (B) which permits escape of water entrapped in the Core Retaining Tube so that fluid under pressure never acts on the core; also, the Back Pressure Valve (A) which closes on the downstroke so that water in the annulus between the two Barrels is driven downward with sufficient force to keep the teeth of the Drill Barrel Shoe (C) free from cuttings.

ANY BAKER REPRESENTATIVE, or office, can furnish additional details on this efficient, low-cost Core Barrel, which provides many advantages in cable tool drilling.

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CABLE TOOL CORE BARREL

We talk a lot, but is anybody listening?

A PROBLEM much discussed in the oil industry these days is the need for better communication. Not microwave communication or other mechanical means, but thought communication.

The need is for better transference of ideas from one mind to another, for better understanding of what we are talking about.

Executives at all levels complain that they have too many reports to read or to write. Yet a constant increase in the volume of paper work fails to bring a proportionate increase in mutual understanding. It always seems to take a second set of words to explain the first set.

Technical men complain of the difficulty of making management understand the significance and value of their research work. Management men complain of the difficulty of making subordinates understand company policy and efficient methods of operation. The whole industry complains of the difficulty of making the Government and the general public understand how and why the oil industry functions.

WHY THIS PROBLEM? We all speak the same language—or do we? Evidently we don't. In spite of—or because of—the marvelous breadth and flexibility of the English language, the most difficult task in the world seems to be to say exactly what we mean so that our listeners comprehend precisely what we are thinking.

While this is a universal human problem, in oil it is compounded by the variety of sciences, technical practices, operating methods, ideas, and peculiar problems which are intertwined in our industry. Researchers have created a veritable Tower of Babel with their technical jargon. Accountants, attorneys, personnel men, and other specialists all have their own private lingo.

BUT GETTING UNDERSTANDING, moving an idea from one mind to another, is a problem far larger than vocabulary. It involves an appreciation of the intended reader's background, thought processes, and psychological attitudes, and requires a painstaking effort to write in terms of the reader's understanding.

Here is one case where realization of the heart of the problem is more than half its solution. Once we realize that our ideas may not be registering, we can concentrate on improving our vehicles of thought transmittal. The solution is not more words, but fewer words chosen and arranged in a way to hit the bull's-eye of the reader's mind.

A habit of thinking in the other fellow's terms might cut in half the volume of the industry's paper work and make the remainder more effective by being faster to read and easier to absorb. In fact, a good many of the industry's problems might be solved through more attention to the effectiveness of our communications methods.

GLASS GUN INCREASED PRODUCTION FROM SHOW TO 960 BOPD!

Two previous perforating jobs with conventional jet charges had failed to open flow channels for the oil

Production from a well in a conglomerate formation still remained negligible after two attempts to perforate with conventional jet charges. It was thought that the producing section had been mudded off when the well was drilled in.

In another effort to bring in the well, the operator decided to perforate with the Dowell Glass Gun, using GG-4 charges. Within a few hours after Dowell engineers did the job, the well was producing at the rate of 960 barrels of oil per day!

Drum tests through casing into cement and sand demonstrate the extra value you get in perforating, when you use Dowell Perfojet Service with the Glass Gun. In such tests, Glass Gun charges have shown larger hole sizes and twice the penetration of conventional charges.

Four sizes of charges permit Glass Guns to be tailor-made to fit a wide variety of shooting patterns and hole sizes. Charges can be set to fire in single, double, or triple vertical rows, and at angles up to 30° from horizontal. Because it is self-destroying, there is no danger of hanging the gun in the casing after firing. The well is left junk-free.

Dowell Electric Pilot equipment is used in Glass Gun perforating. These sensitive recording instruments give the engineers fingertip control over the entire operation. Dowell's active safety program is planned to protect both personnel and well equipment. And Dowell research is aimed to give you more profitable perforating jobs.

For more information about how Dowell Glass Guns can help you, contact your nearest Dowell Station. Or, if you prefer, write directly to Dowell Incorporated, Tulsa 1, Oklahoma, Department H-11.

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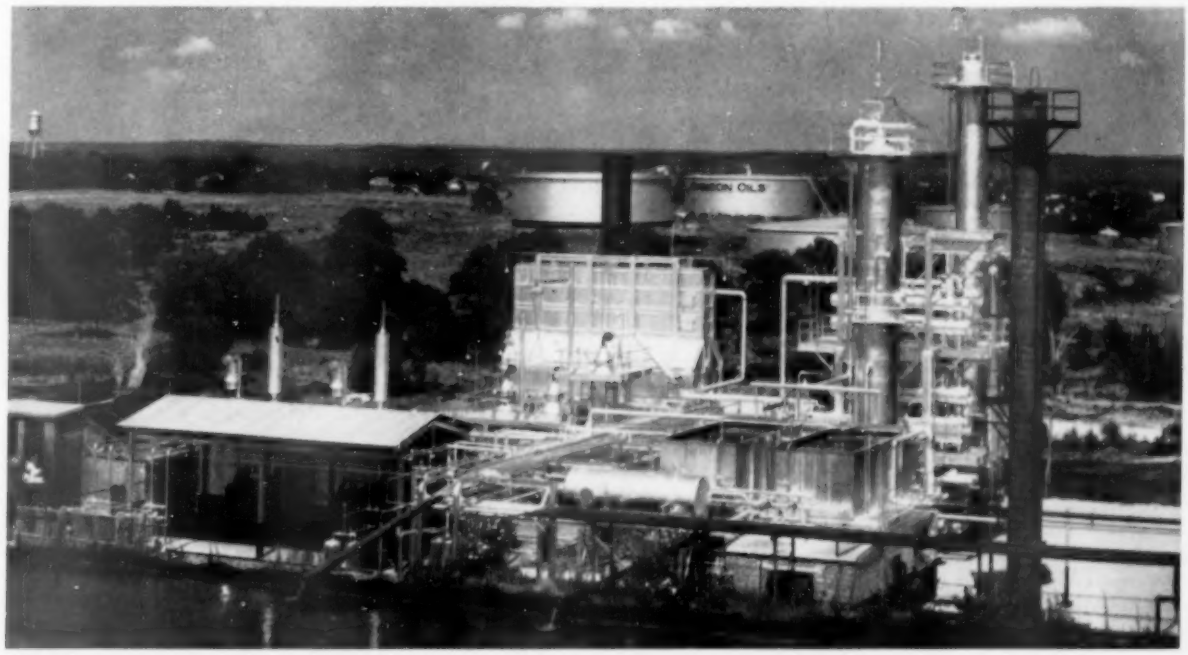
THIS WEEK . . . . . IN THE NEWS



CATALYTIC REFORMING UNITS such as this one at a small Oklahoma refinery are the principal physical factor in the rising level of octane ratings. Cat reforming capacity is now above 360,000 bbl. daily, will pass 600,000 before year-end, and will reach 950,000 bbl. a day before mid-1955. Small refineries, such as this one of Johnson Oil & Refining Co. at Cleveland, Okla., still hold the edge on the major companies in cat reforming, based on percentage of crude throughput. For details on the octane race, turn the page.

REGULATION—Federal Power Commission, armed with new powers bestowed by the Supreme Court, takes two bold steps toward further regulations of the natural-gas industry. . . . The commission suspends consideration of Louisiana Pipe Line Co.'s plans for a gas line from Louisiana to Michigan and knocks down the escalator clauses in a contract between Phillips Petroleum Co. and Michigan-Wisconsin Pipe Line Co. . . . Under the latter ruling, Michigan-Wisconsin would have to refund to its customers money collected under the disputed rate increases. . . . ¶Alberta Petroleum and Natural Gas Conservation Board relaxes rules on coring wells in the Cardium sand. . . . ¶Saskatchewan's oil and gas conservation regulations are amended. . . . Nevada Oil and Gas Conservation Commission publishes regulations governing drilling and production in country's newest oil state. . . .

INTERNATIONAL—Speedy resumption of Iranian oil industry expected after agreement reached in 3-year dispute. . . . Iran will pay Anglo-Iranian $70,000,000 compensation. . . . Operations may be resumed by October 1. . . . ¶Crude-oil production in Free World increases sharply, despite drop in U. S. output. . . . ¶Three American oil companies plan oil exploration in Cuba. . . . ¶Chilean cabinet decides to open the nation to foreign oil capital. . . .

PIPELINES—Houston Texas Gas & Oil Co. unveils third set of plans for natural-gas pipeline between South Louisiana and the East Coast. . . . 1,000-mile system, if approved, would include a network of 34, 30, 20, and 16-in. lines into Florida and Georgia. . . . ¶American Pipe Line Corp. requests bids for pipe to go into proposed 1,425-mile products line from Beaumont to Newark, N. J. . . . ¶First shipment enters 540-mile Yellowstone products pipeline system now nearing completion. . . .

REFINING—The octane race among refiners will continue for several years, Journal survey indicates. . . . Some premium motor fuel may reach the 100-octane level within 3 or 4 years. . . . ¶Petroleum refining is only manufacturing industry in the nation to ring up greater profit before taxes in the first quarter of this year than in the corresponding quarter last year and also the last quarter of 1953, survey shows . . . ¶Sunray Oil Corp. enters novel agreement with Deep Rock Oil Corp. and Midland Cooperatives, Inc., to obtain residual oil for its new coking unit at Duncan, Okla. . . . New plant will process resid from three Oklahoma refineries, thus assuring profitable outlet for the low-grade product and getting more gas oil for charging to Sunray cat cracker. . . .

EXPLORATION—West Texas wildcat flows estimated 5,000 M.c.f. of dry gas daily on drill-stem test in Ellenburger sand. . . . Prospective producer is Gulf Oil Corp.-Phillips Petroleum Co. 1 Toyah Unit, 10 miles west of Pecos in Reeves County. . . . ¶Gulf is drilling below 17,550 ft. at its 1 P. G. Northrup, deepest test ever drilled in West Texas. . . . ¶New field is indicated in Hinds County, Mississippi, at Oakley dome, about 8 miles south of the county's first producer. . . . ¶Stanolind Oil & Gas Co. abandoned first test drilled off Texas on the outer Continental Shelf as a dry hole. . . .

Octane Outlook: 100 in 1957?

- **Race now is in high gear as cat-reforming capacity heads toward a startling 946,000 bbl. next year**
- **Experts differ on where and when the climb will end, but, barring war, they see no letup soon**

George Weber

THE octane race is going to be with us for a few more years at least. Although it may slow down as levels approach the 100 mark, the combination of oil-industry competition for quality and gallonage, plus the sustained pressure in automotive compression ratios likely will force the octane level and motor-fuel quality steadily upward.

In fact, it is highly likely that within 3 to 4 years some premium brands of 100 research octane gasoline will be on the market. And it may be sooner than that.

These are the conclusions of a number of oil and chemical company economists and engineers who are keeping an eye on the trends in motor-fuel quality. Their data indicate a continued octane rise at decreasing yearly increments, until the average premium bumps 98 and regular hits an average of 92. Beyond that, there are few who will hazard a guess, but new techniques and improved catalysts may push the ceiling even higher.

There are some who do not agree. One major company, and a big one, believes premium octane will level off at 95, and it claims to have good reasons for the supposition. Others grant the ability of the industry to continue higher in the pool octane it can produce, but do not expect a large volume of 100-octane premium to be made for some time, unless it brings a substantial super-premium price. But these views are in the minority. Obviously, all predictions assume the U. S. gets into no shooting war.

Factors involved . . . The actual plotting of future octane levels requires a certain degree of crystal-balling. On the one hand it is possible to fix the present potential for making octanes, and to project this potential on the basis of new construction contracts and tentative plans by refiners. This may be extended by assuming refiners will approach an ultimate limit in the use of presently-known processes designed to produce octanes. Hence the near-future ability of the industry to produce higher-octane fuels can be determined with some validity.

Factors which incite actual octane increases are much more difficult to evaluate. They involve the supply-demand relationship, increases in compression ratios, company prestige and surprise competitive moves by sales departments. One can only guess at these factors, but educated guesses are required if companies are to be apprised of possible developments.

Catalytic reforming booms . . . Capability of U. S. refiners to increase octane numbers is presently rising faster than at any time since the war. By a wide margin, the greatest factor in this rise is the record building of catalytic reforming units.

The cat reforming boom has exceeded practically all timetables this year. At the beginning of 1954, the national capacity stood at about 200,000 bbl. per stream day. By mid-year this total approached 360,000 bbl. per day, an 80 per cent increase in 6 months.

The projected expansion based on firm contracts is still rising. At the first of 1954, it appeared that catalytic reforming capacity might rise to about 600,000 bbl. per day by January 1, 1955. New contracts signed since then have made that estimate conservative. Now contracted or under construction are more than 60 units with aggregate stream-day capacity of more than 580,000 bbl.

On completion of the units now contracted, the nation's total capacity will rise to 946,000 bbl. per day. This capacity may be projected for about the second quarter of 1955. It is difficult to estimate capacity gains much more closely since new projects are announced weekly and construction periods vary from a few months to a year.

The Platforming process has maintained its lead at the first of the year and will account for over 50 per cent of all units now operating or ordered. Some other processes which appeared on the scene later may receive added adoption as the first units go on stream and provide commercial data to prospective licensors.

Effect on octane . . . The effect of this record building program on the octane potential of the national gasoline pool is substantial. While individual company positions will vary widely, it is valid to generalize on the average, in indicating the over-all trend resulting from this new construction.

One estimate by a well-known company showed an increase of three research octane numbers attributable to the gain in cat reforming from the average of 1953 to the end of 1954. Since the estimate was made, several new units have been announced for completion this year, and the gain might be closer to 3½ octane numbers.

On the same basis, the gain from average cat reforming capacity in 1955 might be placed at 4 to 5 numbers above the 1953 level. This estimate represents the potential octane rise if units were operated at capacity. It excludes those units which are used partially or wholly for production of aromatics.

Limit to cat reforming? . . . When all cat reforming units now contracted are built, the nation's capacity will have reached about 10.7 per cent of total crude capacity per stream day. Two independent sources have estimated that the average yield of prime catalytic reforming feed stock, a 250°-400°F. virgin naphtha, stands at 10.4 and 10.6 per cent of crude charged.

This would indicate that the average U. S. refiner is approaching saturation in catalytic reforming capacity for his best type of feed. Having skimmed off the "cream," the industry might now appear to be in a position to taper off to some extent in adding further capacity. However, averages are misleading in this case, for many companies already have contracted for cat reforming capacity well over 15 per cent.

There remain a large number of companies which are lagging in construction. These companies in closing the

This is the first of two comprehensive articles by the Journal's refining editor on the gasoline-octane outlook. Next week's article will discuss incentives behind the rush toward higher octanes and explore possible trends in the future.

Catalytic Reforming Units in Operation or Contracted

PLATFORMING

Atlas Processing Co., Shreveport, La.	4,400
Aurora Gasoline Co., Detroit, Mich.	7,000
Aurora Gasoline Co., Elsie, Mich.	1,500
Aurora Gasoline Co., Muskegon, Mich.	2,400
Bell Oil & Gas Co., Grandfield, Okla.	1,800
California Oil Co., Perth Amboy, N. J.	10,700
Coltex Refining Co., Colorado City, Tex.	1,500
Continental Oil Co., Lake Charles, La.	*6,000
Continental Oil Co., Ponca City, Okla.	8,900
Cosden Petroleum Corp., Big Spring, Tex.	*4,000
Danaho Refining Co., Pettus, Tex.	†1,000
Derby Oil Co., Wichita, Kans.	†2,000
Eastern States Pet. Co., Inc., Houston, Tex.	*7,000
Elk Refining Co., Falling Rock, W. Va.	1,500
Famariss Oil & Ref. Co., Monument, N. M.	†750
Fletcher Oil Co., Wilmington, Calif.	†2,500
Great Southern Chemical Corp., Corpus Christi, Tex.	*4,000
Gulf Oil Corp., Philadelphia, Pa.	†17,760
Gulf Oil Corp., Port Arthur, Tex.	†33,300
Gulf Oil Corp., Toledo, Ohio	†11,100
Gulf Refining Co., Cleves, Ohio	†10,000
Johnson Oil Refining Co., Cleveland, Okla.	1,800
Kendall Refining Co., Bradford, Pa.	1,500
McMurrey Refining Co., Tyler, Tex.	5,500
McNutt Oil & Refining Co., Brickland, N. M.	600
Mid-West Refineries, Inc., Alma, Mich.	2,400
Naph-Sol Refining Co., Muskegon, Mich.	†1,000
Onyx Refining Co., Hawley, Tex.	650
Pana Refinery Co., Pana, Ill.	650
Petco Corp., Blue Island, Ill.	†5,500
Petroleum Specialties, Inc., Flat Rock, Mich.	1,000
Phillips Petroleum Co., Sweeney, Tex.	†16,000
Phillips Petroleum Co., Borger, Tex.	†7,000
Pontiac Refining Corp., Corpus Christi, Tex.	†5,000
Premier Petroleum Co., Fort Worth, Tex.	1,700
Quaker State Oil Ref. Corp., Oil City, Pa.	1,500
Quaker State Oil Ref. Corp., Emlenton, Pa.	†850
Quaker State Oil Ref. Corp., Farmers Valley, Pa.	†850
Republic Oil Ref. Co., Texas City, Tex.	*5,500
R. J. Oil & Ref. Co., Inc., Princeton, Ind.	900
Rock Island Ref. Corp., Rock Island, Ind.	1,800
Roosevelt Oil & Ref. Corp., Mt. Pleasant, Mich.	*1,800
Rothschild Oil Co., Santa Fe Springs, Calif.	1,000
Shell Oil Co., Anacortes, Wash.	†8,000
Shell Oil Co., Houston, Tex.	*12,000
Shell Oil Co., Martinez, Calif.	4,500
Shell Oil Co., Wilmington, Calif.	*3,300
Shell Oil Co., Wood River, Ill.	16,000
Shell Oil Co., Wood River, Ill.	*4,000
Skelly Oil Co., El Dorado, Kans.	†7,500
Skelly Oil Co., Longview, Tex.	1,800
Standard Oil Co. of Calif., El Segundo, Calif.	*11,000
Standard Oil Co. of Calif., El Segundo, Calif.	†20,000
Standard Oil Co. of Calif., Richmond, Calif.	†20,000
Standard Oil Co. (Ohio), Lima, Ohio	12,000
Sun Oil Co., Toledo, Ohio	15,400
Sunray Oil Corp., Duncan, Okla.	†5,000
Taylor Oil & Gas Co., Port Isabel, Tex.	4,000
Taylor Oil & Gas Co., Corpus Christi, Tex.	6,000
The Texas Co., Amarillo, Tex.	†4,800
The Texas Co., Westville, N. J.	†12,000
The Texas Co., El Paso, Tex.	†3,330
The Texas Co., Lawrenceville, Ind.	†13,000
The Texas Co., Lockport, Ill.	†12,000
The Texas Co., Los Angeles, Calif.	†10,000
The Texas Co., Port Arthur, Tex.	†20,000
The Texas Co., Port Arthur, Tex.	†20,000
The Texas Co., West Tulsa, Okla.	†9,000
Tide Water Associated Oil Co., Avon, Calif.	†10,000
Union Oil Co. of Calif., Wilmington, Calif.	†14,500
Wilcox Oil Co., Bristow, Okla.	1,500

FIXED-BED HYDROFORMING

Continental Oil Co., Ponca City, Okla.	3,850
Esso Standard Oil Co., Baltimore, Md.	†3,000
Humble Oil & Ref. Co., Baytown, Tex.	*27,000
Pan American Ref. Corp., Texas City, Tex.	*7,500
Pure Oil Co., Toledo, Ohio	5,000
Standard Oil Co. of Calif., Richmond, Calif.	*13,750
Standard Oil Co. (Ind.), Whiting, Ind.	*14,000
Texas Co., Lockport, Ill.	9,000
Union Oil Co. of Calif., Oleum, Calif.	8,000

FLUID HYDROFORMING

Cities Service Ref. Corp., Lake Charles, La.	†15,000
Cities Service Oil Co., East Chicago, Ind.	†12,500
Esso Standard Oil Co., Baton Rouge, La.	†27,800
Pan-Am Southern Corp., Destrehan, La.	2,000
Standard Oil Co. (Ind.), Whiting, Ind.	†30,000

HOUDRIFORMING

Ashland Oil & Ref. Co., Catlettsburg, Ky.	†6,000
Commonwealth Oil Ref. Co., Ponce, Puerto Rico	†3,730
Crown Central Pet. Corp., Houston, Tex.	†5,000
Ohio Oil Co., Robinson, Ill.	8,000
Petrocarbon Chemicals, Inc., Irving, Tex.	†*1,000
Sun Oil Co., Marcus Hook, Pa.	*15,540
Sun Oil Co., Marcus Hook, Pa.	†18,000
Western States Ref. Co., N. Salt Lake, Utah	†1,000
Undisclosed	†16,000

ULTRAFORMING

Great Northern Oil Co., St. Paul, Minn.	†6,000
Pan American Ref. Corp., Texas City, Tex.	†21,000
Pan-Am Southern Corp., El Dorado, Ark.	7,200
Standard Oil Co. (Ind.), Casper, Wyo.	†3,750
Standard Oil Co. (Ind.), Mandan, N. D.	†3,750
Standard Oil Co. (Ind.), Sugar Creek, Mo.	†9,000
Standard Oil Co. (Ind.), Wood River, Ill.	†9,000

CATFORMING

Anderson-Prichard Oil Corp., Cyril, Okla.	1,100
Atlantic Refining Co., Philadelphia, Pa.	11,100
Atlantic Refining Co., Port Arthur, Tex.	8,000
Canal Ref. Co., Church Point, La.	†750
Douglas Oil Co. of Calif., Bakersfield, Calif.	2,500
Gladewater Ref. Co., Gladewater, Tex.	†600
Husky Oil Co., Cody, Wyo.	1,500
Malco Refineries, Inc., Prewitt, N. M.	1,000
McBride Refining Co., Inc., La Blanca, Tex.	1,000
Mid-Continent Petroleum Corp., Tulsa, Okla.	7,500
Mohawk Petroleum Corp., Bakersfield, Calif.	†2,500
Union Oil Co. of Calif., Cut Bank, Mont.	†600
United Refining Co., Warren, Pa.	2,600
Williston Basin Ref. Corp., Williston, N. D.	300

THERMOFOR CATALYTIC REFORMING

General Petroleum Corp., Torrance, Calif.	†19,000
Magnolia Petroleum Co., Beaumont, Tex.	†19,000

SINCLAIR REFORMING

Pure Oil Co , Newark, Ohio	†3,000
Sinclair Ref. Co., East Chicago, Ind.	†16,000
Sinclair Ref. Co., Marcus Hook, Pa.	†16,000

CYCLOVERSION

Advance Ref. Co., Inc., Centralia, Ill.	650
Anderson-Prichard Oil Corp., Arkansas City, Ark.	4,000
Gladewater Ref. Co., Gladewater, Tex.	600
R. Lacy, Inc., Big Sandy, Tex.	1,000
Peppers Ref. Co., Oklahoma City, Okla.	1,000
Sid Richardson Ref. Co., Texas City, Tex.	4,000
Shamrock Oil & Gas Corp., Sunray, Tex.	1,500
Sinclair Ref. Co., Hartford, Ill.	6,000
The Somerset Ref. Co., Somerset, Ky.	500
Southwestern Oil & Ref. Co., Corpus Christi, Tex.	5,000
Wisconsin Oil Ref. Co., Inc., Sheboygan, Wis.	1,000

SOVAFORMING

General Petroleum Corp., Ferndale, Wash.	†6,000
Socony-Vacuum Oil Co., Augusta, Kans.	†3,000

HYPERFORMING

Calstate Refining Corp., Long Beach, Calif.	†1,100

* Operated partly or wholly for aromatics synthesis.
† Contracted or under construction.

Estimated Composition of U. S. Gasoline Pool

Component	1951	1953	end 1954
Light straightrun naphtha	25.7	24.8	24.5
Heavy straightrun naphtha	8.9	7.1	0.7
Catalytic cracked	25.6	28.5	34.3
Thermal cracked	15.2	13.8	7.1
Catalytic reformate	0.4	3.4	14.9
Thermal reformate	9.3	8.5	6.3
Polymer	1.2	1.2	1.3
Natural gasoline	8.7	7.7	6.2
Butanes	5.0	5.0	4.7
Pool R.O.N., clear	76	78	81
Pool R.O.N., + 3 ml. T.E.L.	88.5	90.5	93.5

Cat Reforming Capacity by Types

	Operating	Under construction or contracted	Total
Platforming	180,540	303,740	484,280
Hydroforming, fixed bed	88,100	3,000	91,100
Hydroforming, fluid	2,000	85,300	87,300
Houdriforming	23,540	50,730	74,270
Ultraforming	7,200	52,500	59,700
Catforming	36,600	4,450	41,050
Thermofor catalytic reforming		38,000	38,000
Sinclair		35,000	35,000
Cycloversion	25,250		25,250
Sovaforming		9,000	9,000
Hyperforming		1,100	1,100
	363,230	582,820	946,050

gap on competition would need to add an estimated 250,000 bbl. per day in capacity to process their prime virgin naphthas. Hence, a continuation of the current building boom is expected well into 1956.

Beyond that, refiners see an ever-widening base of admissible feed stocks for this process. After the prime feed stock is taken care of refiners will continue to expand their cat reforming activity, turning to wider naphtha cuts, more sour stocks, and eventually to thermal cracked naphthas. This is possible today with some of the more rugged catalysts. It will become increasingly practical with all catalysts including those which show superior yield-octane results but are susceptible to poisoning and loss of activity.

The process to make this possible is catalytic hydrogenation, now economically feasible because of the availability of byproduct hydrogen from the cat reformers themselves. This mild form of hydrogenation, now available from several licensors, is being adapted to many uses. Among the most important will be the processing of marginal stocks to provide high-grade cat reformer feeds. These include straightrun and thermal naphthas and coker gasolines with high sulfur, nitrogen and metal contents.

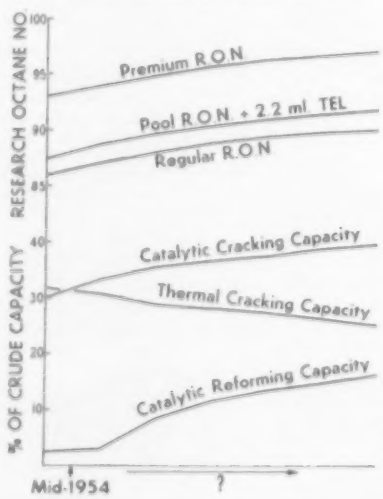
It is considered possible eventually to charge a maximum of about 25 per cent of crude to catalytic reforming operations. This assumes the processing of all but the lightest straightrun fractions, plus a sizable fraction of coker naphtha recovered from the residual crude fraction.

It is generally agreed that, in the light of presently known techniques, the major effect of adding cat reforming capacity will lie in the first 10 per cent based on crude. This gives the greatest octane boost to a low quality straightrun fraction. As competition mounts, however, the process will be applied to less desirable feed stocks and a national average of 20 per cent of total crude capacity is not considered out of line for the future. Some companies already have completed plans for new capacity to handle practically all straightrun stocks plus a fraction of thermal or coker gasoline ranging 15 per cent or more of total feed.

Catalytic cracking capacity . . . The nation's catalytic cracking capacity continues to rise with relation to crude capacity. At the first of this year it stood at about 36 per cent on a stream-day basis. Including all projects completed since that time, plus new contracts, the catalytic cracking capacity will move upward to about 36.6 per cent for the nation's average next year.

This is not considered to be even near the ultimate limit. Various studies of future catalytic activity place the usable capacity at roughly 50 per cent of crude capacity. In actual practice, several refiners today maintain catalytic cracking capacity at figures in excess of 45 per cent of crude capacity. These include both majors and independents, some of the latter going as high as 60 per cent.

Octane Potential as Related to Processing Capacity



The economic incentive for realizing more from the bottom of the barrel will contribute to a steady growth in catalytic cracking in this country. Further adoption of vacuum distillation, coking, and propane decarbonizing will make added fractions of heavy crude available for this important upgrading operation.

Light-ends processing . . . As the level of catalytic cracking rises, and as over-all severity is stepped up to increase octanes, production of light hydrocarbons will increase. The added utilization of these light ends is already evident in modest increase in polymerization capacity in this country.

The popularity of polymerization is expected to grow as octanes inch upward, since polymer represents an important blending agent for obtaining octane improvement. While it is true that the relative blending value of polymer decreases as the over-all pool octane rises, this 105-octane component still remains as an important means to give that extra "kick" that will boost an already high-octane blend just a little higher. The national average on polymer capacity stands at about 1.5 per cent of crude, although some companies maintain much higher operations.

Aviation fuel big factor . . . The nation's alkylation capacity is used almost exclusively for production of aviation gasoline. However, some alkylate is finding its way into motor-fuels, although just how much is difficult to determine.

Total capacity in this country in terms of finished product per stream day has reached about 255,000 bbl., according to reports submitted to The Oil and Gas Journal in the annual refinery survey. This capacity is now considered more than adequate to meet

current avgas requirements in view of cutbacks in military purchasing during the past three quarters. While military planners deny there will be any appreciable decline in avgas requirement before 1956, some others see a gradual shifting of avgas from military to commercial usage. It is generally conceded that increased commercial consumption will roughly offset military reductions as jets increase in service.

A few companies, including some majors and independents, primarily in the Middle West, are now plugging alkylate in their advertising. Others are believed to have fallen back on alkylate to get the octane necessary to maintain competition while building cat reforming facilities.

But alkylate is expensive to produce and most refiners prefer to blend it to higher-valued avgas, since it shows marginal returns in premium motor fuel at current prices. Others have developed a profitable business making odorless solvents from alkylates. Altogether it is estimated that at least 80 per cent of all alkylate production today is going into avgas. Of the remaining 20 per cent, possibly 40,000 barrels per day is going into motor fuel. This represents a very small fraction of total gasoline production.

Alkylate may prove to be more important as a motor-fuel blend, should the price of premium gasoline rise. It shows excellent clean-burning qualities which are of increasing importance in combating today's serious preignition problem. It also shows better octane-blending qualities than polymer when boosting a 98 research octane number pool to 100.

There remain some tailor-made super-high-octane hydrocarbons similar to diisopropyl and triptane, which may come into future use to obtain the extremely-difficult increment in octane as 100 is approached on the scale. Diisopropyl is now blended to motor fuel by Phillips Petroleum Co., but if other such components are in use today, they are not being advertised.

It appears that the additions to the octane potential for the next few years at least will comprise (1) much wider use of catalytic reforming, (2) continued diversion of middle and heavy distillate stocks to catalytic cracking, (3) little change in total thermal cracking, with a swing away from thermal reforming and gas-oil cracking toward residual coking, and (4) added attention to the recovery and recombination of light hydrocarbons.

Plotting the potential . . . It is possible, using yardsticks relating processing capacity to octane, to plot the probable octane levels which the domestic industry will be capable of producing over the next few years.

Most estimates of octane potential of the recent past have been conservative. Some who are watching this sort of thing will admit that the potential is today 1 year ahead of their estimated schedule of only a couple of years ago. Even today, some projections of octane capabilities do not take into consideration all of the cat reforming capacity which is already contracted.

It is believed that at the completion of cat reforming and cat cracking capacity now contracted or under construction, the nation's potential will reach about 90 pool research octane number (R.O.N.) with 2.2 ml. of tetraethyl lead (TEL). This would indicate a possibility that refiners could produce an average premium of 96 and an average regular of 88 by the third or fourth quarters of 1955. This does not mean that octanes will reach that level, but merely that refiners might be able to produce it if they discounted all production costs and operated at maximum capacity for quality.

For the following 18 months or by early 1957, if the construction of new processing facilities follows predictions, it appears that the octane potential may rise to 92 R.O.N. for the pool, with average premium capable of going to 97.5 and average regular to 89. It should be noted that several factors determine whether refiners can economically reach those levels without an improved realization picture.

CANADA

Pembina Core Testing Cut

CALGARY.—In the future only one of the two wells drilled on a quarter section in Pembina field must be cored in Cardium sand.

The Alberta Petroleum and Natural Gas Conservation Board previously required coring all wells in Cardium sand, but have ruled cores are only required in LSD's 2, 4, 10, and 12 of an section. Licenses may be amended for any wells that required coring the Cardium in LSD's 6, 8, 14, and 16 of any section.

Oil-Gas Rules Amended

REGINA.—Saskatchewan's oil and gas conservation regulations have been amended to include a more detailed definition of structure tests.

The amended regulations classify a structure test as any hole drilled for geological and structural information that is less than 6 in. in diameter and drilled to a point below the glacial drift, but not penetrating the Second White Specks.

License conditions also were changed by amendment. The new regulations specify that licenses must be applied for before drilling is started and that a maximum of 20 can be issued under one application.

Canadian Production Sold

DALLAS.—General American Oil Co. of Texas has completed the purchase of production in Central Saskatchewan and announced plans for a 125-well development program.

The transaction involved the purchase by General American of approximately half interest held by Canada Southern Oils, Ltd., in Banff field for about $4,300,000. The Dallas company acquired about 90 producing oil and gas wells and many more proved or probable locations.

A. H. Meadows, General American executive board chairman, said contracts have been let for drilling 125 more wells at an approximate cost of $5 million. Royalite Oil Co., Calgary, is field operator.

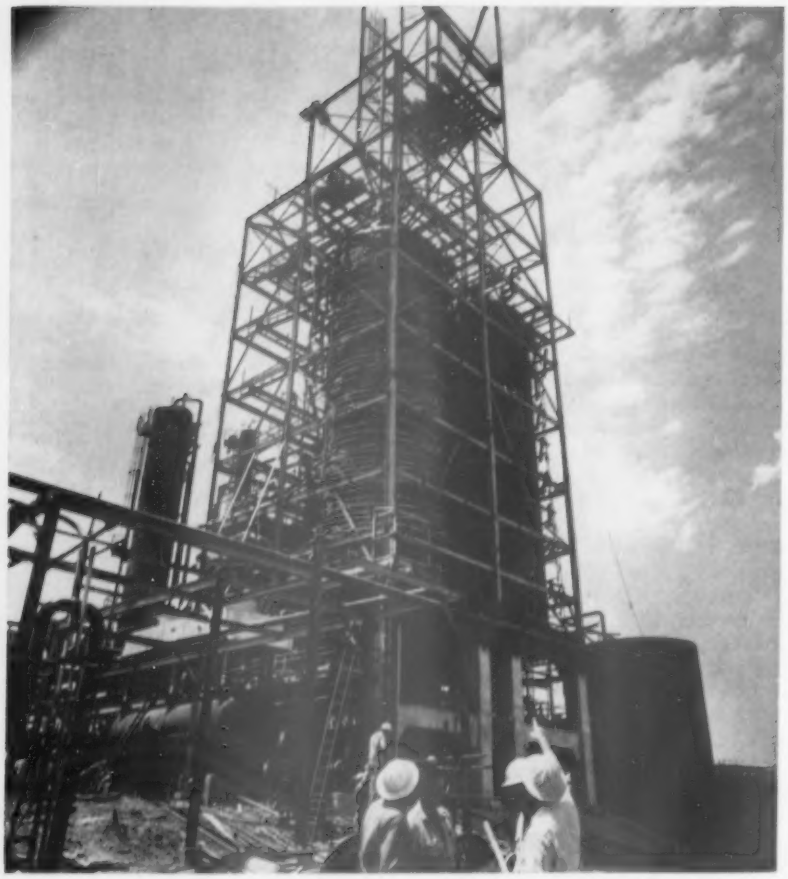
Meadows said crude reserves in the acquired property total 14 million barrels while gas reserves are estimated at 25 billion cubic feet.

Industry Briefs

NEW YORK.—Consolidated Edison Co. of New York, Inc., will begin in mid-September converting 1,500,000 appliances in Manhattan and the Bronx from mixed gas to natural gas. The project, covering all of Manhattan and part of the Bronx, will affect 1,100,000 customers and cost about $27,500,000. It is expected to take 44 months.

RENO, Nev.—The Nevada Oil and Gas Conservation Commission has published a booklet containing general rules and regulations that outline procedures required in drilling and producing oil and natural gas in the state. The booklets are available at the commission's office here.

STATE COLLEGE, Pa.—Strengthening of research facilities at Pennsylvania State University has been urged by two spokesmen for the Pennsylvania Grade Crude Oil Association as one of the best ways to fully develop Pennsylvania's oil fields. J. Paul Jones, director of production for the organization, and F. I. L. Lawrence, director of research for Kendall Refining Co., praised the petroleum research staff at Penn State and emphasized the need for expanded services.



New central coker suggests . . .

. . . How to Lick Resid Problem

DUNCAN, Okla. — Reduced crude from three refineries will be coked here soon under an unusual arrangement which promises economies for all three companies.

Sunray Oil Corp., which operates a 33,600-bbl. refinery here, has contracted to buy residual fuel from Deep Rock Oil Corp. and Midland Cooperatives, Inc., both of which operate plants at Cushing.

The new 9,000-bbl. delayed coker is scheduled to begin operating in mid-September and will begin taking fuel oil from Deep Rock and Midland Cooperatives about November 1.

For Sunray, the arrangement has one important advantage: A big jump in the amount of gas oil available for its cat cracker. The coker will convert half its charge of resid into gas oil, a fourth into gasoline, distillates and light ends, and the other fourth into coke.

The arrangement permits Sunray to operate a coking unit larger than is dictated by its own residual production of about 4,500 bbl. a day. Supply of charge is assured by a long-term contract.

The contracts with Midland Cooperatives and Deep Rock are designed to take all of their production of residual and offer these advantages:

. . . **A long-term outlet** for heavy fuel oil at a price expected to exceed the spot-market value of the product.

. . . **Elimination** of the need for refinery storage of resid.

. . . **A cheaper tank-car rate** obtained by virtue of a fixed amount of heavy fuel to be moved and a long-term shipping arrangement.

. . . **A measure of price protection** by virtue of the fact that the fuel-oil price is pegged to the price of crude oil and will change with any crude-oil price change.

Sunray declined to disclose the initial price to be paid for the charge stock, but it is generally known that it is well above the heavy-fuel spot-market quotations of 90 cents to $1 a barrel when the contract was signed early in June of 1953.

The contract with Midland Co-op calls for delivery of a minimum of 900 bbl. and a maximum of 1,400 bbl. of heavy fuel a day. The Deep Rock contract calls for delivery of 1,000 to 1,100 bbl. daily.

Sunray expects to put the coker on stream with fuel oil from its own operations which is now being stored at Duncan. In normal operations after the additional supply is received, Sunray will have a total supply of about 6,500 bbl. daily. If it is found desirable to increase the throughput of the coking unit, the way is open for the company either to buy heavy fuel on the spot market or contract for an additional long-term supply.

Actually the coking unit at the Sunray refinery is owned by Ucan Products Co., a new company formed by Sunray Oil Corp., Eastman Dillon & Co., and Great Lakes Carbon Co. Sunray owns a 50 per cent interest. Total output of the coke will be handled under a long-term contract by Great Lakes Carbon.

Sunray currently is adding 160,000 bbl. of heavy-fuel storage at the refinery and plans to convert an existing 80,000-bbl. tank to heavy-fuel service.

American Asks Pipe Bids

NEW YORK.—Bids have been requested by American Pipe Line Corp. for 437,000 tons of steel pipe for construction of a proposed 1,425-mile products pipeline from Beaumont to Newark, N. J.

William E. Jeffrey, New York manager for Engineers, Ltd., contractor for the project, announced the invitation for bids, but did not reveal when bids will close.

Jeffrey said hydraulic studies, aerial surveys, and alignment studies have been completed and that right-of-way and ground survey crews are being organized.

The proposed line will range in size from 24 to 26 in. and have a daily capacity of 500,000 bbl.

Drilling Change Adopted

PITTSBURGH.—Substituting air or natural gas for drilling mud has been introduced to the Appalachian area by New York State Natural Gas Corp. with a gas well drilled in Benezette field, Elk County.

A New York State Natural spokesman said the technique was adopted to eliminate seepage into gas-bearing sands and fluid freezing.

SHELL OIL CO. of Canada, Ltd., has expanded its Vancouver refinery's capacity to 15,000 bbl. daily.

EIGHT PRODUCTS LINES run from General Petroleum Corp.'s Ferndale refinery to a wharf in Georgia Strait.

Ferndale Plant Is Another Step In...

...Northwest's Refining Buildup

D. H. Stormont

SEATTLE.—The Pacific Northwest will take another step toward becoming independent of California for its petroleum supplies about October 1 when General Petroleum Corp. starts bringing units on stream at its Ferndale refinery 90 miles northwest of here.

This new plant, Washington's first major refinery and largest in the area, will be able to supply 35,000 bbl. daily of the approximate 290,000-bbl. Pacific Northwest demand. Its products will supplant a portion of those now coming from California.

Initial operations will use Canadian crude, but the company may switch to Venezuelan crude due to low tanker rates *(The Oil and Gas Journal, August 2, page 64)*.

The capacity of three refineries in the Vancouver area were doubled when Alberta crude was first made available on the West Coast. These projects, all completed or nearly complete, doubled the refining center's capacity to 50,000 bbl. daily. The refineries output is practically equal to total petroleum demand in that portion of British Columbia west of the Canadian Rocky Mountains.

When Shell Oil Co. completes its 50,000-bbl. plant at Anacortes, on which construction is just being started, capacity of Pacific Northwest plants will be stepped up to 150,000 bbl. daily. Additional projects being considered at Tacoma and Portland, Ore., would increase this total to 180,000 bbl. The area's refineries probably will be supplying more than half its demand in about 15 months.

Ferndale refinery . . . The new $38 million Ferndale facilities will be essentially completed by Thanksgiving and processing about 25,000 bbl. daily, it is planned.

Three Socony-Vacuum refining processes will be utilized, Thermofor catalytic cracking, Sovaforming, and Solutizer treating. The 20,000-bbl. T.C.C. plant will be the first of a new large size to go into operation. The 6,000 bbl. reforming unit is one of the first two being built. Primary processing facilities include a 35,000-bbl. distillation unit, 9,000-bbl. vacuum unit, and a 6,000-bbl. visbreaker. Also included is a 1,300-bbl. cat poly unit.

One of the most extensive waste-treating system ever installed in a refinery will eliminate air and water pollution. The waste-water treating system will combine chemical treating, stripping, and bacteriological activity. Smokeless burners will consume plant vapors. Total pollution expenditures will amount to over $1,000,000.

Another feature of the plant is the degree to which run-down tankage has been eliminated, resulting in a savings in heat as well as in tankage costs. Streams from one unit will charge directly to another with little surge capacity being provided.

Vancouver plants . . . The Ioco plant of Imperial Oil, Ltd. is processing 22,500 bbl. of Alberta crude daily following completion of a $13,500,000 expansion project. Principal new equipment added were a 7,600-bbl. fluid catalytic cracking unit and atmospheric and vacuum distillation. Contracts will be opened soon on a catalytic polymerization unit.

Last spring Shell Oil Co. of Canada, Ltd. completed a $10,000,000 project which resulted in capacity of its Burrard Inlet plant being raised to 15,000 bbl. In addition to a 5,000-bbl. cat cracker, new facilities include a vacuum unit, cat poly unit, and gas recovery plant.

At nearby North Burnaby, Standard

Oil Co. of B.C. has passed the half-way mark in erecting a $10,000,000, 11,000-bbl. plant near its old Stanovan plant. New facilities include a 7,500-bbl. type IV cat cracker, vacuum flasher, and 2,000-bbl. catalytic polymerization unit. When these are brought on stream in about 3 months, the old plant will be shut down except for some treating, storage, and shipping facilities.

Another refinery possible . . . Refiners in the area are wondering if British American Oil Co. soon will erect a Vancouver plant. Since the Trans Mountain Oil Pipe Line Corp. line from Edmonton was announced, there have been reports such would be the case. Recently a site near the line's terminus was cleared, but no plans for a plant have been revealed.

In contrast to the trend in the United States, no plans for reforming equipment have been made public. To date sufficiently high-octane gasolines have ben obtained through catalytic cracking and polymerization units. For the small amounts of aviation gasolines needed, high-octane blending material is tankered from California plants or shipped in by rail from eastern plants.

Proposed plants . . . Of the proposed plants, the most recent to be announced is that of Sunset Oil Co. The large West Coast independent producer and refiner is contemplating a 20,000-bbl. plant at Portland. It has taken option on a site, according to J. D. Sterling, Sunset president. At Tacoma, Pacific Oil & Gas Co. has announced plans for a 10,000-bbl. plant, as has Washington Processing Co.

The area's first petrochemical plant will be a $12,000,000 project planned by Columbia River Chemicals Corp. near Attalia. Plans call for the erection of an ammonia and ammonia-urea products plant. Fuel oil will be used as the source of hydrogen in synthesizing the ammonia.

Tests of Ohio Well Delayed

BAKERSFIELD. — Delays continue to plague Ohio Oil Co. in its efforts to test potential oil zones above the 17,000-ft. mark in its deep Paloma field test.

Some 2 months ago the company ran 5½-in. casing in 72-4 K.C.L.A., the world's deepest hole, to a depth of 17,-222 ft. Since testing shows below 17,-000 ft., efforts to test shallower shows have been hindered by leaky casing.

Last week the company was squeeze cementing these holes at 13,219 ft. after having performed a similar job at 12,187 ft. The deep test had reached 21,482 ft. when a fishing job last October halted drilling.

Lease Award Deferred

SACRAMENTO, Calif.—The State Lands Commission has deferred awarding a state lease to Richfield Oil Corp. on 1,175 acres of offshort lands for legal study and further investigation.

Richfield was high bidder on the tract, but the bid was protested by Union Oil Co., Shell Oil Co., Continental Oil Co., and Superior Oil Corp., which together submitted the second-high bid. They said the bid was so high that it was "unreasonable."

Richfield's high bid was a royalty factor of 5.2375, which means a 78 per cent royalty for a well producing 100 bbl. daily when applied to the land commission formulas. The four-company group had submitted a factor of 2.03 *(The Oil and Gas Journal, July 5, page 105).*

Drilling Due Upswing

BAKERSFIELD, Calif.—Drilling activity in San Joaquin Valley, currently undergoing a serious slump, will be given a slight stimulant later this month when development of the Antelope shale pool at Buena Vista Hills is resumed.

Development and operation of the fractured shale reservoir was recently unitized with Honolulu Oil Corp. acting as operator. Other companies participating in the unit are Standard Oil Co. of California and its subsidiary, Murvale Oil Co.

GULF COAST

Gas Line Rerouted

Houston Texas Gas & Oil Co. outlines third set of plans for transporting Louisiana natural gas to East Seaboard

HOUSTON.—Its third proposal to transport natural gas from South Louisiana to the East Coast was revealed by Houston Texas Gas & Oil Co. last week with announcement of preliminary plans for a 1,000-mile pipeline system extending into Florida and Georgia.

The latest plan is a modification of the company's original proposal 18 months ago to move gas from Louisiana to New York through a 30-in. line *(The Oil and Gas Journal, March 2, 1953, page 37).* This plan later was revised, calling for transport of gas to New York via a long Florida-Georgia detour *(The Oil and Gas Journal, March 8, page 60).*

The new plan is to lay 300 miles of 34-in. and 300 miles of 30-in. main line plus about 400 miles of 20 and 16-in. laterals. The system would originate in the Louisiana Delta fields, gathering gas through two 20-in. laterals. One of the lateral lines would begin at a point northwest of Houma, La., and the other near the mouth of the Mississippi River. They would converge into main line near Point a la Hache, La.

J. O. Mack of Houston, president of Houston Texas Gas & Oil Co., said the proposal will be presented to the Federal Power Commission for approval within 10 days or 2 weeks. He said construction would start immediately if the FPC grants a certificate of convenience and necessity.

Source not named . . . Mack declined to name the source of gas for the huge system, which would have an initial daily capacity of 500,000,000

cu. ft., but he said the company "has plenty of reserves lined up."

If sufficient gas is not available in the Louisiana Delta region, Mack proposes to build an alternate 20-in. feeder line from the Orange-Beaumont area, connecting with the 34-in. main line near Bay St. Louis, Miss. *(see map)*. The first of four compressor stations would be located at that point.

Plans for the new system from Louisiana to Florida and Georgia do not alter Houtex's earlier proposal to lay a 30-in. line from East Texas fields to Chicago and Duluth.

Mack said a detailed market survey made for the Houston firm by Barnard & Burk, Baton Rouge, shows there is "a vast potential market for natural-gas service in Florida." Since Pensacola is the only major Florida city now served by natural gas, Mack said his company is not competing with any other natural-gas pipeline in Florida "and we do not anticipate any opposition."

The Barnard & Burk survey shows approximately 30 cities in Florida are served with utility gas, distributed either through municipally owned gas systems or private corporate systems. More than 52 per cent of the 1950 Florida population is within nominal service areas of existing utility gas distributors. Estimated 1960 population of the gas-service areas of the 30 cities receiving utility gas will equal 88 per cent of the total 1950 population of the entire state, the survey shows.

Proposed route . . . Plans call for extending the 34-in. line from the gathering-system junction near Point a la Hache to Bay St. Louis, thence to a point north of Mobile, Ala., and almost due east past Tallahassee to Lake City, Fla.

At Lake City the system would branch off into a 20-in. line going north to Georgia and a 30-in. line going south.

The northern branch would extend to a point near Jacksonville, where it would be reduced to 16-in. lines serving Waycross, Jesup, Brunswick, and other Georgia towns.

The 30-in. southern leg would extend to Keystone Heights and Orlando to a point near Winter Haven, Fla. The southern line probably would be reduced to 20-in. pipe there and extend through Central Florida to a junction near Palm Beach. Sixteen-inch lateral lines would extend from the main southern branch to Gainesville, Tampa, Sarasota, and other towns.

Plans call for construction of four compressor stations along the system. In addition to the one near Bay St. Louis, Mack said others probably would be near Crestview, Fla., between Tallahassee and Lake City, and near the junction north of Winter Haven.

Company officials . . . Besides serving as president of Houston Texas Gas & Oil Co., Mack is president of H. & C. C. Oil Co. and Oil Well Processing Co., Houston.

Other officers of Houston Texas Gas & Oil include Frank Roder Smith, New Orleans, former executive vice president of Higgins Shipbuilding Co., who is a vice president and director of the Houston firm; Allen R. Kleinkauf, Houston, vice president, director and executive assistant to Mack; and H. S. Mack, who is secretary-treasurer and a director.

Directors also include H. C. Cockburn, president of Cockburn Oil Co., and L. A. Cage, Taft, Tex., an independent operator and president of Cage Production Co.

New Field Indicated

Mississippi well testing shallow oil, gas showings

JACKSON, Miss.—Hinds County, which got its first commercial oil producer less than 2 weeks ago in a Lower Cretaceous discovery near Bolton, 12 miles west of here, has another indicated new oil field, located on Oakley dome, about 8 miles south and a little west of the Bolton discovery.

The second discovery is by Walter E. Sistrunk at his 1 H. T. Shuff Unit, where testing of indicative oil and gas showings in shallow Wilcox (Eocene) sand overlying the dome's cap rock is under way.

Previous open-hole drill-stem tests in a series of intervals below 2,450 ft. to the well's total depth at 2,605 ft., in the cap rock obtained oil recoveries. Best recovery was in the interval at 2,491-97 ft. in 11¼ ft. of saturated sand. This was 260 ft. of gas and 100 ft. of 37.9°-gravity oil, plus 20 ft. of mud-cut oil.

Larco well . . . Meanwhile, Larco Oil Co.'s new Lower Cretaceous discovery well at Bolton is being placed on production following preliminary testing and is reported to be flowing at the rate of 203 bbl. of oil per day through ⅛-in. choke with pressure of 1,050 psi.

Drilling already is under way at a south offset test.

Tender Nears Completion

MADISONVILLE, La. — Construction is nearly complete on a 250-ft. drill tender being built here for Kerr-McGee Oil Industries.

The welded steel vessel will be equipped similar to Kermac's present tender, which is a converted Y F barge. It will have a house topside, an elevated platform at the stern, and a sea wall. The tender is 50 feet wide and has a moulded depth of 15 ft., 8 in.

Shelf Test Dry

Stanolind abandons Texas tidelands for Louisiana

HOUSTON.—Stanolind Oil & Gas Co. has abandoned its wildcat 19 miles off Texas on the outer Continental Shelf as a dry hole.

The test, first outer shelf venture off Texas since the submerged lands act was passed, was abandoned at 14,000 ft. August 5. All equipment, including the complete jacket assembly for the 83-by-82-ft. platform standing in 58 ft. of water, will be salvaged.

A Stanolind spokesman said the company is "pulling clear out of the Texas tidelands" and will move the LST tender ship and rig to a new location off the Louisiana coast. The Louisiana location, also on federally controlled land, is about 10 miles from shore near the Cameron-Vermilion parish line.

The abandoned well is in State Tract L-141, 19 miles from nearest land and 25 miles east of Galveston. Loffland Brothers, Tulsa, drilled the test 1,000 ft. deeper than the contracted depth. Stanolind owns all the equipment except the rig.

One discovery . . . There has been only one offshore oil discovery of commercial quantities on the Texas tidelands, either inside state jurisdiction or on the outer Continental Shelf. This is Standard Oil Co. of Texas' wildcat which found oil 1½ miles off Mustang Island, Nueces County, South Texas.

One other wildcat in deep water is now drilling, Gulf Oil Corp.'s venture on Block L-774 about 8½ miles from shore.

Offshore Choices Filed

WASHINGTON.—A "considerable" number of nominations have been filed for leasing tracts in the Continental Shelf off Louisiana.

The Bureau of Land Management last week declined to estimate how many nominations were submitted, but said the number assured keen interest in the federal lands.

The bureau will open nominations September 3 for oil and gas and sulfur leases in federal lands off Texas.

Bids are tentatively scheduled to be opened October 13 for the Louisiana tracts and November 9 for the Texas lands.

FPC Flexes Its New Muscles

- **Commission strikes down Phillips' escalator clauses, delays big gas-line ruling**
- **Senate holds up funds, however, indicating spread of power may be slowed**

WASHINGTON.—The Federal Power Commission began throwing its weight around last week.

Under its broad, new powers received from the Supreme Court, the FPC took these two bold steps to regulate independent producers who sell gas to interstate lines:

It suspended consideration of American Louisiana Pipe Line Co.'s plans for a 1,000-mile, 30-in. gas line from Louisiana to Michigan. This was based on the assumption that American Louisiana has no legal gas supply until all producers committed to the line have applied for FPC permission to sell their gas.

It held invalid the escalator clauses in the contract between Phillips Petroleum Co. and Michigan-Wisconsin Pipe Line Co. and ordered Michigan-Wisconsin to refund to its customers the money collected under the higher rates.

In another important development, the Senate refused to appropriate the $300,000 requested for employment of lawyers and accountants to assist FPC in carrying out its new "mandate."

. . . American Louisiana

The commission reset hearings on an application by American Louisiana Pipe Line Co. to build a 1,000-mile line from Louisiana to Michigan from August 6 to September 13 to permit gas suppliers to prepare the applications now required for certificates to sell gas.

This action is the result of Order No. 174 *(The Oil and Gas Journal, July 26, page 140)*. Under this order, no gas producer may start a new service without FPC approval—therefore, no proposed pipeline will have a legal gas supply unless the suppliers has received certificates to sell gas.

American Louisiana has agreements with six gas producers to supply gas for the proposed line.

Panhandle Eastern Pipe Line Co., which opposed the application, filed a motion to adjourn the hearings on the ground that the Supreme Court decision in the Phillips case would affect the potential gas supply of American Louisiana. Although this motion was denied, the commission voted to suspend the hearings to permit the suppliers time to file the needed applications.

The commission announced it "assumes the producers here who have agreed to supply American Louisiana will remain desirous of supplying natural gas for the latter's proposed project."

Panhandle pointed out two of the six suppliers are oil companies with escape clauses in their contracts to protect them from federal control of prices. The other contracts run out October 1, Panhandle added.

. . . Michigan-Wisconsin

Here the FPC ruled that Michigan-Wisconsin could not charge higher rates to its customers on the grounds that Phillips' escalator clause was raising its costs for gas.

The FPC reasoned this way:

. . . **Phillips,** according to the June 7 decision of the U. S. Supreme Court, is now a natural-gas company under the meaning of the Natural Gas Act.

. . . **Natural-gas companies** cannot raise their rates except in accordance with the Natural Gas Act and cannot charge any price not approved by, and on file with, the FPC.

. . . **The automatic increases** provided by the escalator clause in the contract between Phillips and Michigan-Wisconsin were not approved and are therefore invalid.

Phillips hit indirectly . . . Actually, the FPC decision involved Phillips only indirectly, and no order directing Phillips to change its rates has been issued.

Whether this would be done, or whether the next step would be up to Michigan-Wisconsin, was a matter of speculation. The ruling appeared to leave Michigan-Wisconsin in the uncomfortable position of paying more for its gas than it is permitted to charge.

The ruling was contained in an order directing Michigan-Wisconsin to reduce its rates by about $4,813,800 a year and to refund to its customers $8,300,000 collected under the higher rates.

Two rate increases were involved, one which had been collected under bond since October 1, 1951, and the other in effect since December 12, 1952.

In asking for these increases, Michigan-Wisconsin pointed out that its costs had risen as a result of the automatic gas-price increases provided by the escalator clause in its contract with Phillips. The FPC told Michigan-Wisconsin it could not use these increases in determining costs since they were invalid under the Natural Gas Act, to which Phillips is now subject.

The commission allowed Michigan-Wisconsin a 6 per cent rate of return, after determining its cost of operation, using as the base period the year ending April 30, 1952.

Michigan-Wisconsin sells to 16 pipeline and distribution companies serving 40 cities and towns in Michigan, Wisconsin, Iowa, and Missouri. Most of its gas goes to Detroit and Milwaukee.

. . . Appropriation Denied

The commission's efforts to exercise its new power may be stymied by the Senate's refusal to approve $300,000 requested for employment of lawyers and accountants.

The appropriation request went to the Senate in supplemental estimates from the White House for inclusion in the final money bill already approved by the House. The Senate appropriations committee, by a vote of 15 to 1, denied the funds.

Sen. Homer E. Ferguson of Michigan, who backed the appropriation, offered it as an amendment from the floor, but the senators cut his argument short and rejected the amendment without a roll call.

Ferguson said the denial, in effect, nullifies the Supreme Court decision. He predicted the commission will be forced to suspend all rate changes pending some action either to provide funds or reverse the decision.

Refining Profits Lead Industry

WASHINGTON.—Petroleum refining was the only manufacturing industry in the United States to show greater profit, before taxes, in the first quarter of this year than in the corresponding quarter and also the final quarter of 1953.

Surveys made by the Securities and Exchange Commission and the Federal Trade Commission place American refining's first quarter profits at $735,000,000 before taxes, compared with

$705,000,000 in the corresponding quarter of last year and $718,000,000 in the fourth quarter.

Refining's profit figures after taxes in the first quarter were $534,000,000 compared with $488,000,000 in 1953's first quarter and $624,000,000 in the fourth quarter.

U. S. Tankers Lagging

WASHINGTON.—The United Kingdom is rapidly overhauling the United States in privately owned tanker tonnage.

While the U. S. fleet still is the largest under a single national flag, it is only by a narrow margin. The United Kingdom has 3,000,000 deadweight tons on order, compared to only 250,000 tons under construction here, American Merchant Marine Institute said.

During the first half of this year, the U. S. private tanker fleet declined by a net of 13 vessels, with 17 transferred or sold abroad, two scrapped and one transferred to inland service. Only 7 large tankers were constructed.

The American tanker fleet is due to expand, however, under legislation enacted by Congress authorizing the "trade in" of present obsolete vessels on new large-capacity ships and providing for the long-term chartering by the Navy of 15 supertankers which are to be built by private operators for the purpose.

Rubber Policy Change Seen

WASHINGTON. — Congress may change its mind next year on the advisability of transferring synthetic-rubber production from the government to private industry.

This possibility is seen in some rubber-industry circles as a result of the recent settlement of the Indochina War which gave the Communists large new territory in Southeast Asia but gave no assurance that the Reds would not make further forays in that area.

Although practically all of Indochina's rubber is in the non-Communist sector, it is pointed out that the Geneva settlement will be regarded in other parts of Southeast Asia as a Communist victory and almost certainly will strengthen Communist supporters in the principal rubber-growing areas.

The rubber-facilities disposal commission, now negotiating for sale of the government plants, will submit a sales program to Congress next January. Unless there is a more-stable peace in Southeast Asia by then, it is quite possible an effort will be made in Congress to continue government operation of the plants.

Fuel Studies Started

Both White House and Senate slate study of fuel resources as coal interests open all-out fight on oil imports, gas

WASHINGTON. — Prodded by the nation's coal interests, both the White House and the Senate last week launched studies of the country's fuel resources.

President Eisenhower appointed a Cabinet committee on energy supplies and resources headed by Arthur S. Flemming, mobilization director, to make a 4-month study.

At the request of Gov. John S. Fine of Pennsylvania, chairman of the Governors' Fuel Conference, the Senate interior committee also moved to initiate an all-out investigation of the nation's fuel resource problems.

After a conference with coal state congressmen and coal industry representatives, the President also set up a bituminous coal industry commission.

The President instructed Flemming to submit his recommendations not later than December 1, indicating the possibility Congress may be asked to enact energy policy legislation next year. Felix E. Wormser, assistant secretary for mineral resources will be the Interior representative on the committee which will also include representatives of the State, Defense, Justice, Commerce and Labor departments.

Study target . . . Flemming's group will study requirements and supplies of coal, lignite, coke, coal tars, synthetic liquid fuels, petroleum and natural gas and he is empowered to appoint nongovernment experts in each of these fields to serve as members of study groups.

The defense of the nation in war and the continued expansion of the economy in peacetime were given by the President as the basis of the study.

While the White House committee will get to work immediately, there is some question where the Senate investigation will get under way before next session. It will be conducted by a subcommittee headed by Sen. George W. Malone of Nevada.

Both groups of investigators will cover about the same ground. Among the proposals submitted for consideration by the coal interests are:

. . . Limitation of residual oil imports.

. . . Protection of coal against excessive natural gas competition.

. . . Increased use of coal instead of oil for producing electric power.

. . . Lower freight rates for coal to enable it to compete with natural gas.

. . . More use of coal instead of oil in public building heating.

Coal pressure . . . Behind the two-front move on energy supplies is the intensifying demand from the coal industry and coal-producing states for action to halt the loss of markets to oil and natural gas. Coal interests claim this will result in a shortage of fuel in case of war because mines now being shut down for lack of markets could not be reopened and workers forced but could not be replaced quickly.

Coal's major targets are imports of foreign residual oil and the spreading industrial use of natural gas.

Alaskan Opening Studied

WASHINGTON.—Opening up more than 20,000,000 acres of North Alaska lands for private development is being held up while Interior Department officials study provisions to protect the Gubik gas area against homestead or other applications.

There is no question of revoking a 1943 order which withdrew from private development the lands across the northern end of Alaska and surrounding Naval Petroleum Reserve No. 4. *(The Oil and Gas Journal, June 21, page 120).* The question which has been raised is whether all lands in the areas should be opened for all purposes, including homesteading — although it is doubtful whether anyone would want to bed down in the frozen and not yet fully-explored northern part of the territory.

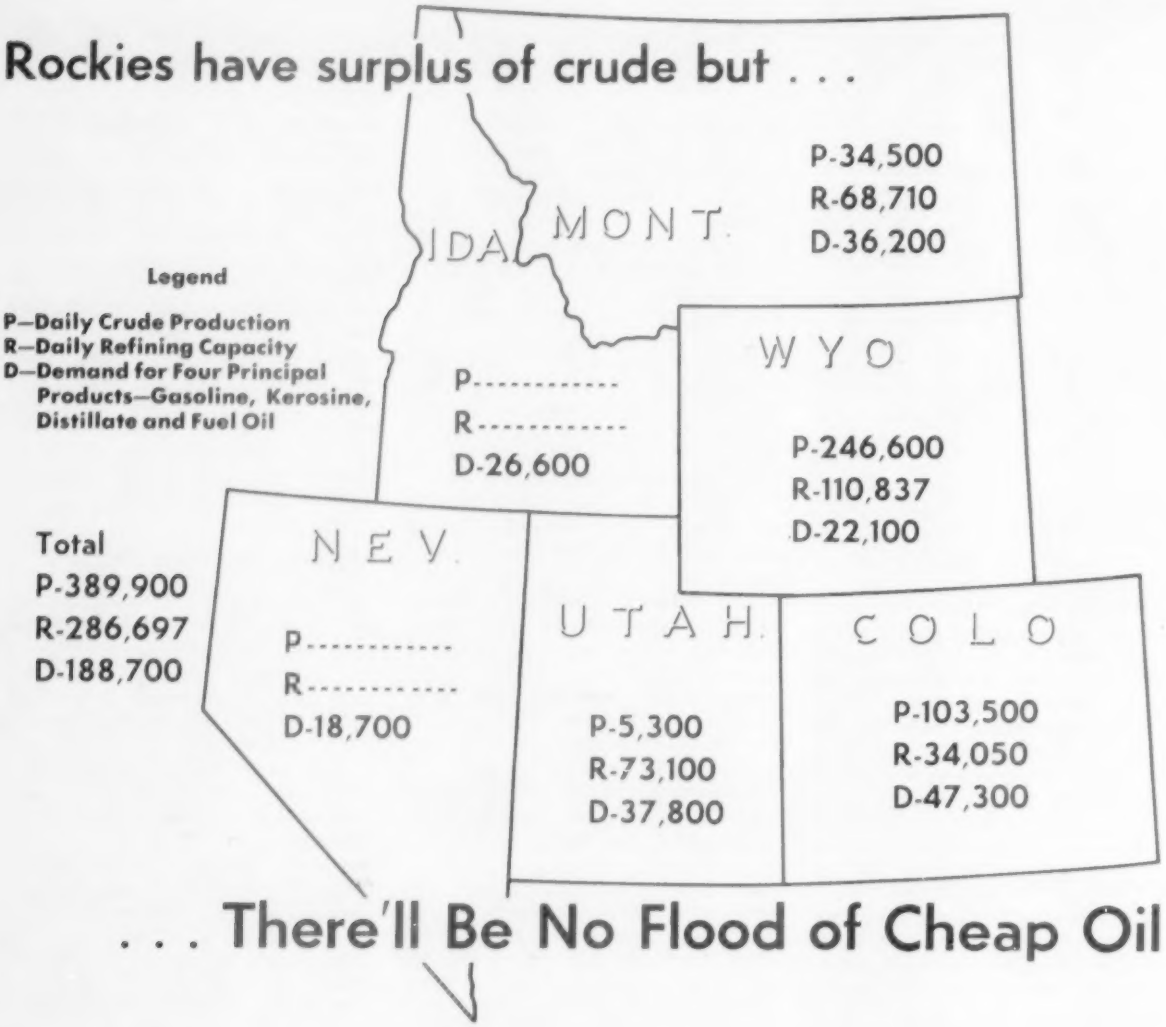
Thinking now appears to be that the whole area should be opened except the lands in the vicinity of the Gubik gas field which would be opened only for oil and gas development.

Federal Leases Offered

WASHINGTON.—The Bureau of Land Management is offering oil and gas leases on approximately 1,116 acres of Wyoming and Michigan public lands.

The bureau has invited bids on six tracts of 160 acres each and one tract of 115.91 acres in the Thornton field area of Crook and Weston counties in Wyoming. The Michigan parcel covers 40 acres in Clare County, within the known geologic structure of Headquarters field undefined.

Rockies have surplus of crude but . . .



. . . There'll Be No Flood of Cheap Oil

C. O. Willson

DENVER—The Rocky Mountain area will not become a sustained bearish factor in crude oil markets. The comparative costs of new and old production will not support or justify such a program.

Operators in the area for years have had inadequate outlets for many of their fields. With additional facilities available over the past year, their output has replaced production in distant areas to a limited extent and that trend may continue for a year or longer.

More markets are needed and additional long-distance pipe lines are to be built serving the Rocky Mountain states and adjoining areas, but once the inevitable adjustments to major changes in supply have been made there is no reason to expect that the mountain states will dispose of any part of their crude oil below the accepted levels of competing areas.

The six Rocky Mountain states shown in the accompanying map are often termed one of the two or three remaining oil frontiers of this country, and extensive exploration has been, and will continue to be, carried on because of that belief. Important reserves have been found in small and large fields, but there is no evidence that operators are in a position to flood markets with cheap oil. In some sections of the area the cost of finding and developing properties has been above the national average and higher, not lower, prices are needed to encourage further activity.

There is the additional fact that Rocky Mountain crude oil is generally more distant from the important market centers to the east than are those of the Middle West or the northern part of the Mid-Continent. This is another cost factor which will enter into comparative pricing once temporary conditions are ended.

It is true that crude oil prices in some fields are posted below comparable crude oil outside the Rocky Mountains. This is due competitive conditions prevailing within the area and also reflects the fact that operators in the past have often been compelled to absorb part of tank-car transportation costs if the crude was transported in that manner. With operators now demanding higher posted levels it is expected this price situation will correct itself when adequate pipeline markets are established.

In balance . . . The accompanying balance sheet of the Rocky Mountain area shows that at present refining facilities and local demands are about in balance.

Balance Sheet On Rocky Mountain Operations

	Barrels daily						
	Crude-oil prod. (1st 6 mo. 1954)	Refining capacity	Consumption* (1954)	Total proven reserves (bbl.)	Ratio of reserves to prod., years	Population (1950)	Area (sq. miles)
Colorado	103,500	34,050	47,300	310,000,000	8.7	1,325,089	104,247
Idaho			26,600			588,637	83,357
Montana	34,500	68,710	36,200	180,000,000	15.1	591,024	147,138
Nevada†			18,700			160,083	110,540
Utah	5,300	73,100	37,800	42,000,000	23.5	688,862	84,916
Wyoming	246,600	110,837	22,100	1,200,000,000	14.5	290,529	97,914
Total	389,900	286,697	188,700	1,732,000,000	13.1	3,644,224	628,312
Per cent of U. S. total	6.1	3.4	2.4	5.8	12.5	2.4	20.8

*Gasoline, kerosine, distillate, fuel oil. Other products totaled 21,900 bbl. daily. †One well discovery field.

Increases in consumption in the six states are in line with the national average, which means that an additional refinery supply of around 15,000 bbl. daily will take care of the yearly increases in local consumption. Any expansion in crude-oil supply over this yearly increase will have to find distant markets.

The area itself, and that which immediately surrounds it for the most part, is not heavily populated, which assures that additional crude oil or product pipelines several hundred miles in length will have to be built as markets for the crude oil are needed. Important competition in the form of crude-oil production or refining facilities is present over part of the marketing areas immediately adjoining the mountain states.

Often in analyses of Rocky Mountain conditions Arizona and New Mexico are included. They are not in this instance because the two states are dominated directly by oil conditions in California and West Texas and are tied in with oil operations to the north only in a limited manner.

Refining-marketing . . . Refiners in the six states have balanced their operations in line with demands in a remarkable manner. As shown in the table the 39 refineries have a crude-oil capacity of 286,697 bbl. daily and in April, the latest report of the Bureau of Mines, they processed an average of 210,000 bbl. daily.

Demand for the four principal products of the refineries—gasoline, distillate, kerosine and fuel oil—this year will average an estimated 188,700 bbl. daily. This demand for other products—principally asphalt, road oil and lubricating oil—is estimated at 21,000 bbl. daily. Thus the total demand and crude runs to stills of the six states are approximately each 210,000 bbl. daily.

This means that the small imports into the area and exports to adjoining states of refinery products currently offset each other. The principal importation comes from the 6-in. product line of Phillips Petroleum Co. and Shamrock Oil & Gas Corp. which connects Denver and other Colorado points to refineries located in the Texas Panhandle. Small quantities are brought into the area by tank car.

In addition, there are exports from refineries by pipeline and tank car both on the west and east. The 8-in. lines of Salt Lake Pipe Line Co. extend across northeast Oregon and southeast Washington terminating at Spokane. Refineries in the eastern part of the area supply limited quantities of products by tank car to western North Dakota, South Dakota, and Nebraska. Through the years substantial quantities of fuel oil have been disposed of in the iron range country of Minnesota and other distant markets.

While the six states have 20.8 per cent of the land area of the United States they only have 2.4 per cent of the population and about the same percentage of the petroleum market. The demands are largely concentrated in the few population centers of Denver, Salt Lake City, Casper, Cheyenne, Billings, and Great Falls. All of these cities have one or more refineries. In addition to the Phillips-Shamrock line, Denver is supplied by a product line connecting to Casper and Cheyenne.

With refinery output more than adequate to take care of local needs, the Yellowstone Pipe Line Co. is laying a 10-in. line extending from the Billings and Laurel refineries to Spokane. When completed this fall this line will represent the most important outside outlet for Rocky Mountain refinery output, but it will not destroy the essential balance of the area in supplying its own requirement with its own products. Wyoming-Nebraska Pipe Line Co. is building a 6-in. product pipe line between Cheyenne and North Platte, Neb.

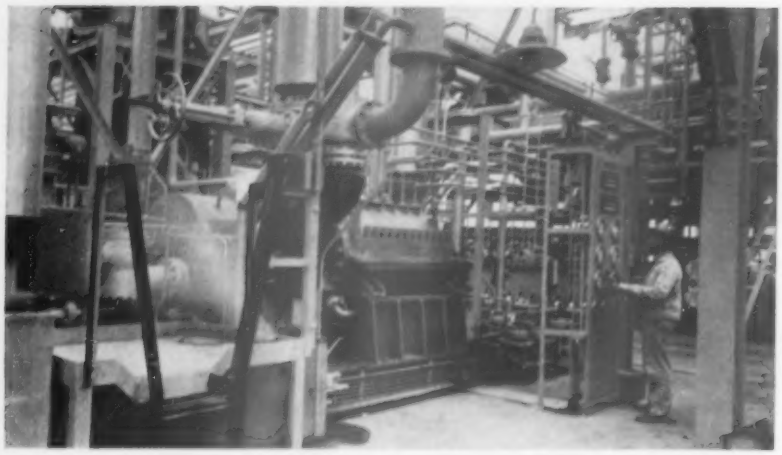
FIFTEEN LARGEST FIELDS
(Wyoming and Colorado only)

Fields	Proven reserves (bbl.)	Daily output (bbl.)
Denver-Julesburg, Colo.	350,000,000	74,000
Elk Basin, Wyo.	250,000,000	23,000
Rangely, Colo.	200,000,000	61,000
Manderson, Wyo.	65,000,000	
Oregon Basin, Wyo.	60,000,000	10,000
Clarenton, Wyo.	50,000,000	10,000
Lost Soldier, Wyo.	40,000,000	12,000
Mush Creek, Wyo.	40,000,000	6,500
Big Sand Draw, Wyo.	40,000,000	6,400
Salt Creek, Wyo.	40,000,000	12,500
Byron and Garland, Wyo.	35,000,000	17,600
Glenrock, Wyo.	30,000,000	12,000
Bonanza, Wyo.	30,000,000	10,000
Beaver Creek, Wyo.	30,000,000	2,000
Total	1,260,000,000	271,000
Per cent of total	73	63

200,000 bbl. excess crude . . . For the first 6 months of this year crude-oil production averaged 389,900 bbl. daily in the six states. To this should be added 20,000 bbl. daily representing production in Nebraska and Kansas which is part of the Denver-Julesburg basin. With crude runs to stills of 210,000 bbl. daily in April a surplus of crude oil over refinery requirements of 200,000 bbl. daily is now indicated.

This figure checks approximately with information which indicates that Service Pipe Line Co. is transporting 60,000 bbl. daily in its line, with the deliveries of the Platte Pipe Line Co. averaging 140,000 bbl. daily. Small shipments of crude oil by tank car are being made to refineries located several hundred miles from the fields.

Platte operations . . . The Platte sys-



Centrifugal Condenser Installed in Ammonia Plant

Phillips Petroleum Co. has installed the first anhydrous ammonia centrifugal condensing unit to be placed in any United States plant. This picture, made in the company's Pasadena, Tex., plant, shows an operator at the controls of the unit, which reduces heat of compression by liquid injection, thereby permitting six stages of compression in a single casing. Two centrifugal compressors, each driven by a steam turbine, provide 3,000 tons of ammonia refrigeration at 14° F. evaporator and 100° F. condensing temperature. The new unit was installed by Worthington Corp.

tem (Sinclair, Pure, Continental, British-American, Ohio) which connects several Wyoming fields to the East St. Louis, Ill., area with connections to Denver-Julesburg basin, was started early last year and its operation has brought the contention that Wyoming and Colorado crude is supplanting supplies formerly obtained from the Mid-Continent and Middle West fields.

Market analysts point out that so large a new supply to the market of the Middle West could not become effective without disturbing the movement of crude oil prevailing before the line was completed. It is also agreed that in making the new supplies available it is probable that some concessions in prices were made effective involving part of the supply. This is in line with general experience in the past.

It is contended by operators, however, that most of the Platte deliveries were absorbed by increased consumption in the area affected and furthermore that the entire deliveries represent a small fraction of the total deliveries which move north out of Southwest and Middle West fields to Middle West refineries by pipeline and water. On the other hand Oklahoma, Kansas, and Texas operators point to reduced allowables as due in part to the operation of the Platte line.

Proven reserves . . . It will be noted in the accompanying balance-sheet table that the ratio of proven reserves to yearly production commonly called "years supply" in the Rocky Mountain states is only a little higher than the national average. This is additional proof that the area as a whole is not hard pressed for outlets to the point where price will not be a matter of major consideration.

The accompanying table of the 15 largest fields in the area does not reveal, however, a wide variation in the relationship of proven reserves to years' supply and this is partially due to a lack of pipeline outlets. In some cases the quality of the crude oil is the major factor in not being able to expand outlets.

These 15 fields largely dominate producing conditions in the Rocky Mountain states accounting for 73 per cent of the proven reserves and 63 per cent of the current production. The area does have a large number of small pools some of which have no pipeline outlets at this time.

More pipelines . . . Plans are under way which will add substantially to the crude-oil pipeline outlets of Colorado and Wyoming as previously explained. The Platte system is being further expanded and will transport approximately 200,000 bbl. daily starting in early fall.

Arapahoe Pipe Line Co. has been organized to build a big-inch crude-oil line from Merino, Colo. to the Denver-Julesburg area to Humboldt, Kans., where it will connect with the Sinclair Pipe Line Co. system.

The Sinclair line is said to have space for that quantity of crude in its main system extending north from the fields of Oklahoma, Kansas, and Texas to the Chicago area. Pure is a large producer in the Denver-Julesburg area and will have additional output available within the next few months. The company recently purchased the 45,000-bbl. refinery of the Globe Oil & Refining Co. at Lemont, Ill., in the Chicago area.

As previously explained Sinclair and Pure are two of the five owners of the Platte system. It is presumed that the new Arapahoe line would divert some crude from the Platte line. It is said that other crude supplies would be available to assure the capacity operation of the Platte system.

Service Pipe Line Co. plans to increase the capacity of its line which connects to Kansas City, Chicago, and Wood River, Ill., refineries as well as its Casper plant located in the mountain area. The expansion being discussed would double the capacity of line from the mountain states, now 60,000 bbl. daily, furnishing an additional outlet for both Wyoming and Colorado fields. In addition, one or more lines are being discussed from the Williston basin with possible connections to Wyoming or Colorado.

Yellowstone Being Filled

BILLINGS.—The 540-mile Yellowstone products pipeline system is being filled and is scheduled for completion before August 25.

The first shipment through the $20,000,000 line is 18,500 bbl. of diesel fuel that was pumped into the line at Billings. The fuel is expected to reach Spokane, Wash., western terminus of the line, by August 25.

All but a 5-mile section near Thompson Falls, Mont., has been completed.

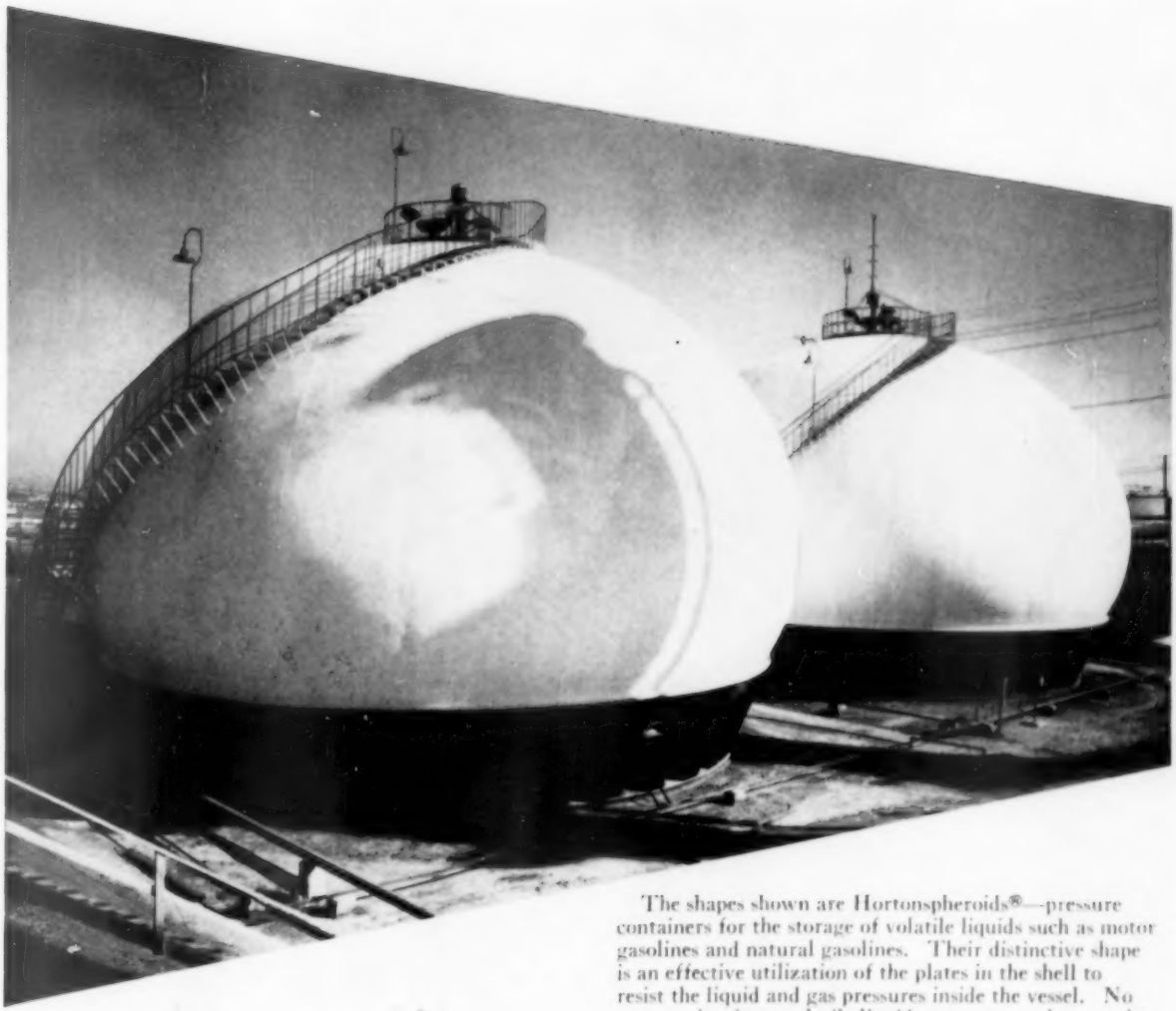
The 10-in. line will have an initial capacity of 30,000 bbl. Ownership of Yellowstone is divided with Continental Oil Co. owning 40 per cent, Interstate Oil Pipeline Co. 40 per cent, Union Oil Co. 14 per cent, and the H. Earl Clack interests of Spokane and Havre, Mont., 6 per cent.

Gasoline Plant Building

DENVER.—A $2,000,000 natural-gasoline plant and gas-gathering system 30 miles south of Brush, Colo., and 75 miles east of here is now under construction.

The new plant will process gas from Little Beaver, Badger Creek, and Bobcat oil fields of Washington and Adams counties, and will have a capacity of 10,000 M.c.f. daily.

The installation, including a low-temperature-extraction plant, pipeline gathering systems, and a field residue system, will go into operation by November 1.



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Detroit, 26 ..... 1514 Lafayette Bldg.
Houston, 2 ..... 2119 C & I Life Bldg.
Los Angeles, 17 ..... 1523 General Petroleum Bldg.
New York, 6 ..... 3347—165 Broadway Bldg.
Philadelphia, 3 ..... 1615—1700 Walnut Street Bldg.
Pittsburgh, 19 ..... 3228 Alcoa Bldg.
Salt Lake City, 4 ..... 525 West 17th South St.
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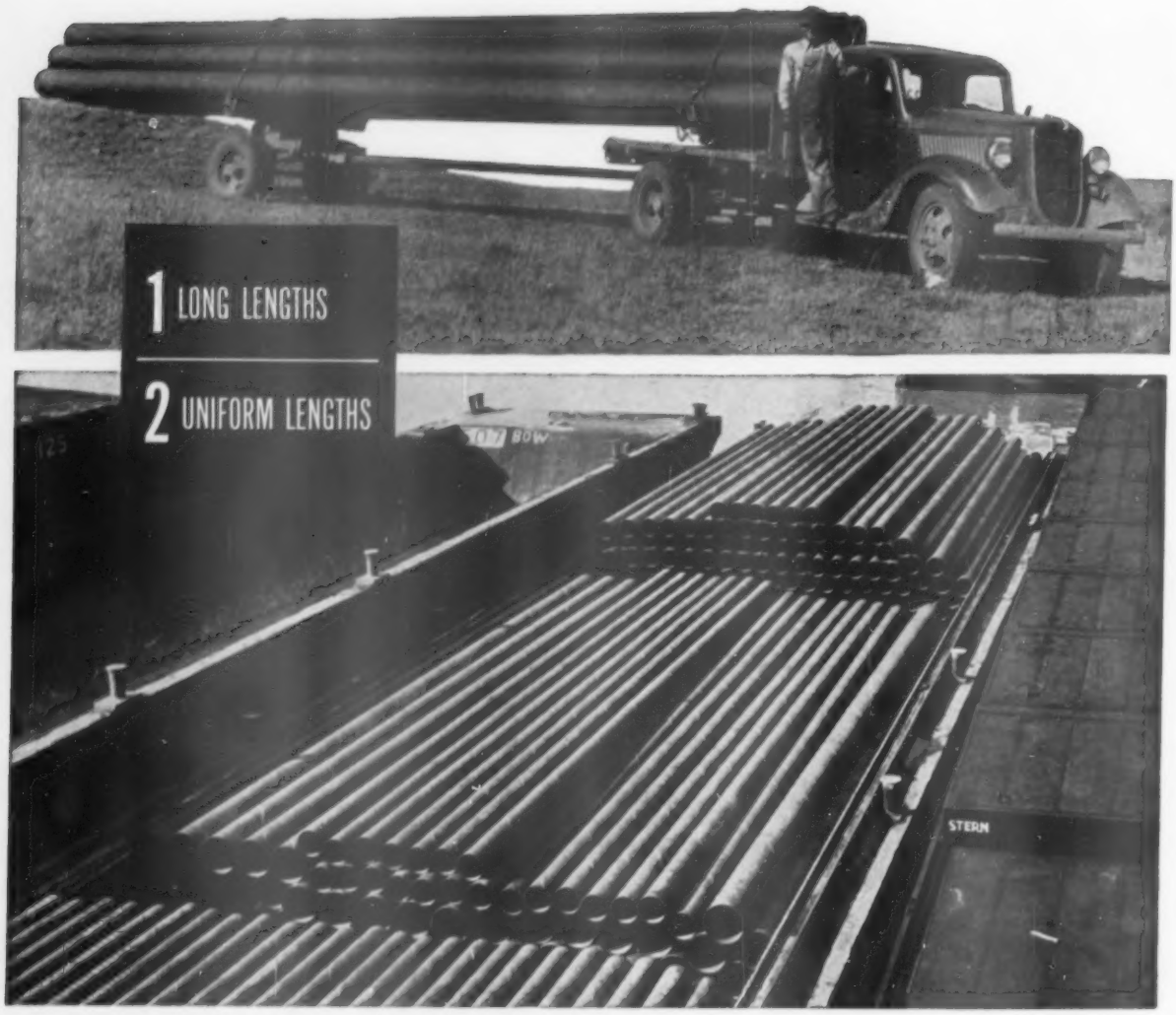

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Continental Oil Co. will operate the facilities for a group of nine owners. They are: Conoco, Sinclair Oil & Gas Co., Lion Oil Co., Col-Tex Oil, Inc., Denver Basin Oil Co., Calstar Petroleum Co., Bill Tomberlin, Triangle "J" Oil Co., and J. A. McRae, Ltd., all of Denver.

Rehearing Sought

Plea for pipeline permit renewed by N. D. Natural

BISMARCK.—North Dakota Natural Gas Transmission Co., St. Paul, has asked the Public Service Commission to rehear its application for permit to construct a 474-mile pipeline from Tioga eastward to Fargo and Grand Forks.

The commission earlier denied North Dakota Natural's request for modification for a conditional certificate granted in May *(The Oil and Gas Journal, July 26, page 143)*.

North Dakota Natural contends "new matters of substantial importance" have arisen, including an extension of time on its contract with Amerada Petroleum Corp. for purchase of gas.

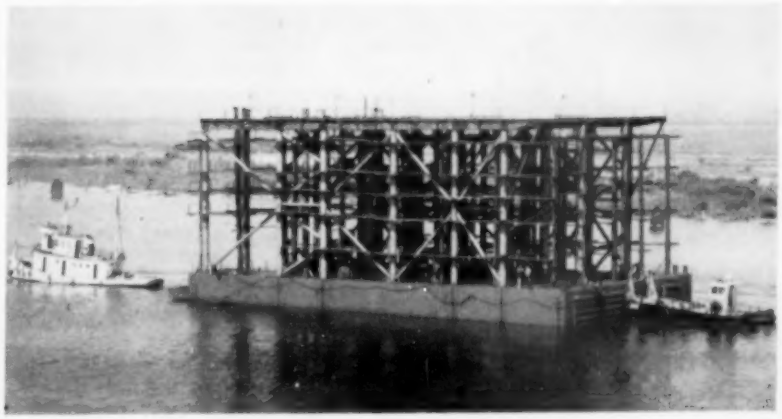
Adequate supply claimed . . . The applicant said it had a commitment from Amerada that its officials would appear if a rehearing is granted. These officials will offer "competent evidence" that the applicant will have an adequate supply of gas, North Dakota Natural said.

The pipeline company also claims Amerada is willing to modify its sales contract. Three of the five modifications sought by the firm involved its contract with Amerada.

North Dakota Natural also told the commission it has had "extensive negotiations" with Montana-Dakota Utilities Co. for gas storage facilities. If obtained, the company said, these facilities "would materially increase the supply of gas for firm service, not only in communities which it proposes to service, but also in additional territory."

Rival application pending . . . Hearing on a rival's application for permit to construct a gas line from Tioga to Fargo has been postponed by the Public Service Commission until October 5 *(The Oil and Gas Journal, August 2, page 62)*. The applicant, Northern Natural Gas Co., is seeking to build a 24-in. line from Tioga to Fargo as a segment of its proposed system to transport Alberta natural gas to Minneapolis-St. Paul.

Ruling on North Dakota Natural's latest application will be delayed at least 10 days to permit interested parties to file answers to the petition, a commission spokesman said.



New Submersible Barge Ready for Outfitting

Outfitting with the equipment needed to drill in 40 ft. of water in the Gulf of Mexico comes next for this newly-launched submersible drilling barge. Built by the Ingalls Shipbuilding Corp. at Pascagoula, Miss., for Kerr-McGee Oil Industries, Inc., "Rig 44" is destined for deep drilling in the Gulf.

Drilling at New High

Rocky Mountain area chalks up 455 completions in July

DENVER.—July in the Rocky Mountain region saw drilling activity soar to a new high for any one month in the area's history. A total of 455 wells were completed in the eight Rocky Mountain states during the month. Footage climbed to 2,416,144 ft.

Of the total 455 wells, 141 were wildcats, 19 of which were successful. About 750,000 ft. of exploratory hole was dug. Colorado led the area with 61 wildcats completed. There were 22 in Wyoming, 15 in North Dakota, 13 each in Montana and Nebraska, 15 in northern New Mexico, and 2 in Utah.

July completion figures accounted for about 20 per cent of the 2,357 wells completed so far this year.

Records to fall . . . All indications are that drilling records will fall in the Rocky Mountain region this year. The last half of this year should be even more active than the first. The important drilling areas during the last half of 1954 will be Montana area west of the Williston basin, the San Juan basin, western Colorado, and the Green River basin, plus continued high level of activity in the Denver-Julesburg basin. The prospective Pacific Northwest gas line is already responsible for new drilling and locating in the San Juan basin, Green River basin, and Utah *(see page 159 in Exploration Section)*.

Gas Supply Nearer

FPC turns down rehearing of Pacific Northwest case

SEATTLE.—The Federal Power Commission has denied requests for a rehearing of its approval of the Pacific Northwest pipeline, virtually assuring this region natural gas by late next year.

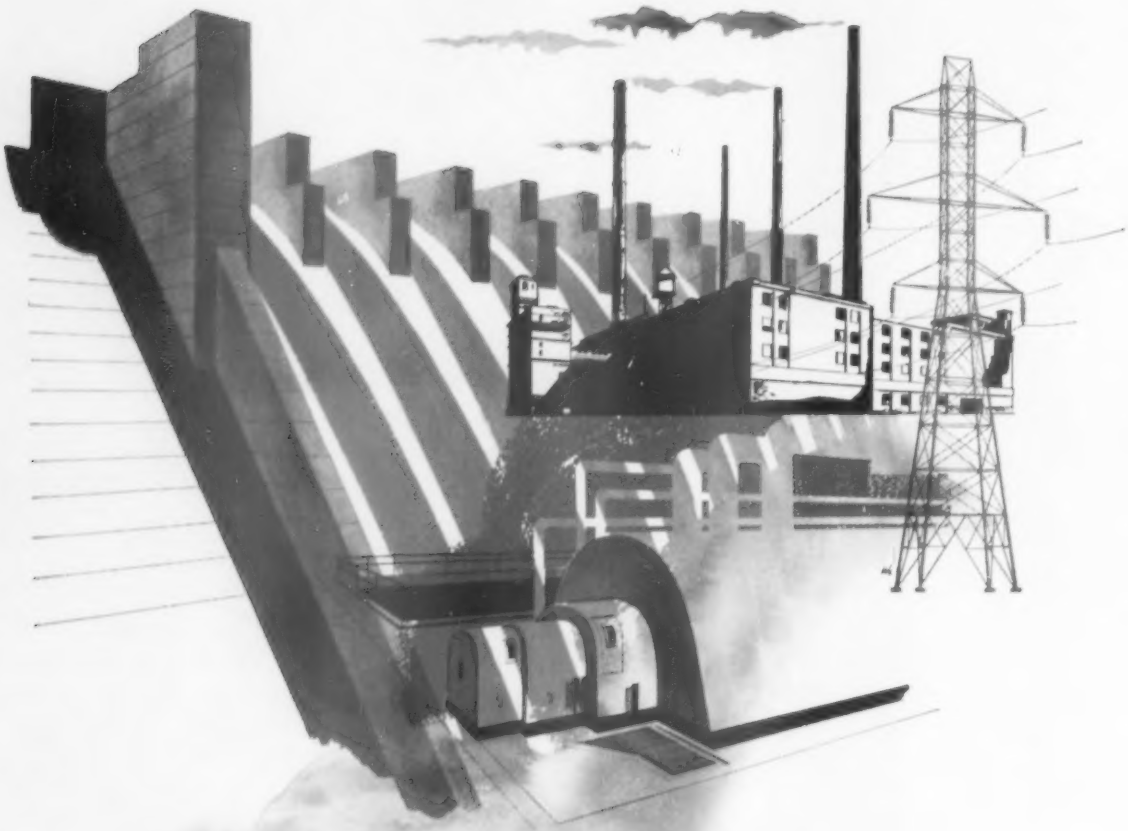
Westcoast Transmission Co., Inc., Wilmington, Del., and Trans-Northwest Gas, Inc., Spokane, sought the rehearing. Both were seeking to import Canadian gas into this region when the FPC gave Pacific Northwest the nod to build a gas line from the San Juan basin to this region.

Westcoast Transmission, principal opponent of the Pacific Northwest line, is expected to seek a court review of the commission's refusal to rehear the case.

Contracts signed . . . In another development, Pacific Northwest announced it has signed contracts with seven natural-gas distributing companies who will sell gas to practically every Washington state community.

Robert R. Herring, Northwest vice president, said his company anticipates "no serious delay" in building the 1,466-mile line that will bring the Pacific Northwest its first natural gas. He said first deliveries are expected to be made late in 1955.

The firms under contract for the gas are Spokane Gas & Fuel Co., Washington Gas & Electric Co., Cascade Natural Gas Corp., Seattle Gas Co., United Gas Co., California-Pacific Utilities Co., and Twin Cities Gas Co.



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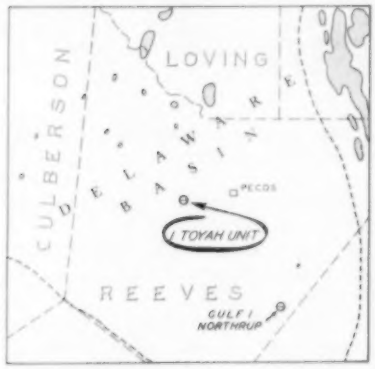


Wildcat Tests Gas

Deep Delaware basin well tests dry Ellenburger gas

PECOS, Tex. — Dry gas from the Ellenburger is reported at Gulf Oil Corp.-Phillips Petroleum Co. et al 1 Toyah Unit, closely-watched Delaware basin deep wildcat 10 miles west of here.

The deep test made an estimated 5,000 M.c.f. of dry gas per day on a drill-stem test in the Ellenburger at 14,787-888 ft. The wildcat also showed for dry gas in the Devonian.

High temperatures were recorded at the bottom of the wildcat hole. The bottom-hole temperature registered 318° F.

The 1 Toyah Unit is located in Section 20, Block C-17, Public School Land Survey, Reeves County. The showing in the Ellenburger, while not as encouraging as oil recovery would be, does give impetus to the increased hopes for deep pre-Permian production in the Delaware basin area.

Humble Sells Crude System

RISING STAR, Tex.—Humble Oil & Refining Co. has sold its crude-oil gathering system in Brown, Eastland, and Comanche counties, North-Central Texas, to Scurlock Oil Co., Houston.

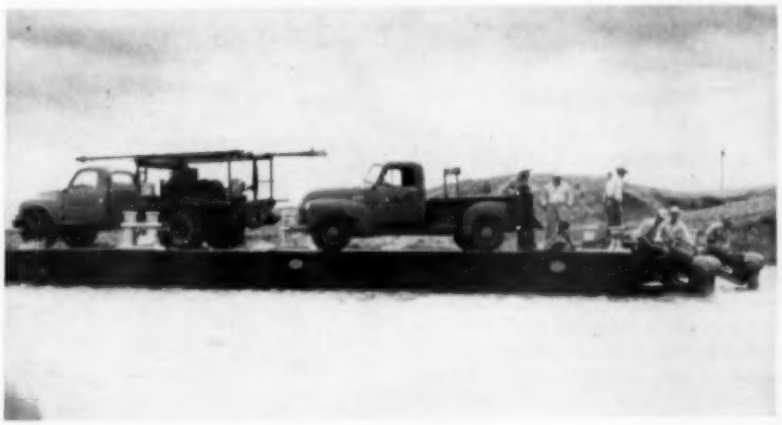
The 160-mile system handles about 1,600-bbl. of oil daily from 872 wells on 228 leases. Humble had operated the system since it was built in 1924-25 after the discovery of Pioneer field.

Gulf Continues Deep Well

FORT WORTH.—Gulf Oil Corp. was drilling below 17,550 ft. last week at its 1 P. G. Northrup et al, the deepest well ever drilled in West Texas.

The well is located in Section 33, Block 50, T-8, T & P Survey, about 24 miles southeast of Pecos in Reeves County. Geologically, it is in the southeastern portion of the Delaware basin.

The well is tentatively scheduled to go to about 18,500 ft. It has long since broken the depth record for the area formerly held by Richardson & Bass 1 Harrison-Federal in the southeastern corner of Eddy County, New Mexico. This well was drilled to 16,705 ft. and at that depth was still in Wolfcamp sediments of lower Permian age.



Outboard Barge Services . . .

. . . West Texas Lake Mounds

THE maiden voyage of what is probably the only heavy-equipment barge operating in semi-arid West Texas has been proclaimed a success by its developers.

The 110,000-lb. barge, powered by four 25-hp. outboard motors, is being used by the Colorado River Municipal Water District to transport men and equipment to oil production mounds in Lake J. B. Thomas near Big Spring.

Equipped with extra-long shafts and 11-in. diameter propellers with a 10-in. pitch, the motors are synchronized in pairs and mounted on outriggers attached to the stern of the barge. The barge is handled by reducing power on one pair of motors and increasing it on the opposite pair.

The barge is 70 by 25 ft. and draws 18 in. of water unloaded and 36 in. at its 50-ton capacity. The water district provided the mounds on which producing wells are located and furnishes transportation to company personnel when wells require servicing.

Iranian Oil To Flow Again

- 3-year struggle ends with hopes for speedy reactivation of industry; operations may be resumed by October 1
- Anglo-Iranian to get $70 million for damages; Iranian parliament, consortium board expected to OK terms

Dahl M. Duff

THE 3-year-old Iranian oil problem was finally settled last week. The successful conclusion of negotiations which began last April was announced in London and in Teheran.

Initial exports of oil are expected to be made within 2 months after legal enactment of the agreements into law by the Iranian parliament and their approval by the board of directors of the eight-company international oil consortium. It is hoped operations can begin by October 1.

The agreements reached provided for:

. . . **The terms** under which the consortium will carry out large scale producing and refining operations in Iran.

. . . **Payments of** £25,000,000 or $70,000,000 as compensation to Anglo-Iranian Oil Co., Ltd., by the Iranian Government.

Two companies formed . . . A joint statement in Teheran by Ali Amini, Iranian finance minister and chief negotiator, and Howard Page, a Standard Oil Co. (N.J.), director and head of the consortium's negotiating team, said redevelopment of the Iranian oil industry will be undertaken by two companies formed by the consortium and the National Iranian Oil Co. One will be responsible for exploration and the other for refining. Each company will have seven directors, two of them nominated by Iran.

Production of crude oil after the first 3 months will rise progressively to a total of 80,000,000 cubic meters, or about 500,000,000 bbl. in the next 3 years. After this period, the consortium will take from Iran quantities of crude oil which will "reasonably reflect the supply and demand trend for Middle East crude oil, assuming favorable operating and economic conditions in Iran."

The half a billion barrels to be produced over 3 years works out to an average of about 457,000 bbl. daily. It is reliably reported that output the first year will average around 300,000 bbl. daily, 460,000 bbl. daily the second year, and 600,000 bbl. daily the third year.

After the initial starting period of 3 months, oil revenue for Iran during the first 3 years of operation will total the equivalent of $420,000,000 at present prices and costs. Of this, Iran will receive $86,800,000 in the first full operating year, increasing to $187,600,000 in the third year.

Abadan plans . . . The statement said large scale operations at Abadan would be resumed "as quickly as possible."

The estimated rate of production, it said, will "once again establish Abadan's output as the largest in the Eastern Hemisphere, despite sharp increases in that area during the last 3 years." Present largest refinery in the Eastern Hemisphere is Arabian American Oil Co.'s Ras Tanura plant with a throughput ranging up to about 245,000 bbl. daily.

Damages covered . . . The £25,000,000 will be paid by Iran in 10 equal annual installments commencing January 1, 1957. The payments are free of interest. It is understood this sum compensates Anglo-Iranian for the Kermanshah refinery of 2,500 bbl. daily capacity, the nearby Naft-i-Shah field, the Anglo-Iranian distribution facilities in Iran, and for the company's losses in meeting requirements from alternate sources during the last 3 years. Kermanshah and Naft-i-Shah will be operated by Iran to meet domestic petroleum needs.

In London, Anglo-Iranian said, "The compensation agreement is an integral part of a general settlement under which Anglo-Iranian Oil Co. will have 40 per cent interest in the consortium and will receive payments from the other members of the consortium for the remaining 60 per cent interest. In view of this, the company has not claimed compensation from Iran for loss of future profits."

The sum to be paid is in full and final settlement of all claims and counter claims of both Iran and the company.

Quick passage seen . . . In Iran, the agreements were hailed as a victory and there seemed little doubt they would be speedily approved by the parliament. British sources expressed hope the settlement would lead to better conditions in the Middle East.

Legal title to all Anglo-Iranian's vast installations and properties in Iran pass immediately to the Iranian Government. However, in the interests of restoring Iranian oil to world markets, the operating companies to be incorporated under Dutch law will enjoy the "beneficial use" of the installations for the duration of the agreement.

The final step clearing the way for reactivation of the Iranian oil industry will be the ratification of the agreement by Iran's parliament. The documents are due to be submitted later this month or early in September.

Although most of the previous disclosures on the agreement thus were made by Iranian sources, the broad outline of the plan under which the consortium will operate gradually became apparent on an unofficial basis during the weeks the negotiations have been in progress.

The concession rights to be held by the consortium in some respects resemble generally the main features of the agreement under which operations are now carried out in Iraq. Iran takes 50 per cent of the net profits after costs, has two of the seven members of the boards of the two Dutch-registered operating companies, and receives its payments in sterling, 40 per cent of which, it has been reported, will be convertible to dollars.

The rights to the consortium run for 25 years with another 15 years in extensions. This 40-year term places the final expiration date at 1994, 1 year after the old Anglo-Iranian concession would have expired. Anglo-Iranian's concession covered about 100,000 sq. miles in southwestern Iran, but it is understood the boundaries of the approximately equal area in which the consortium will have exclusive exploitation rights will differ considerably from the limits of the Anglo-Iranian concession. After the initial 25-year period, the consortium must surrender 20 per cent of its total area with each 5-year extension of the concession term.

Free World Output Up

Crude production records broken in Saudi Arabia, Iraq, and West Germany; downward trend reversed in Venezuela

FREE world crude-oil production outside the United States rose sharply in May, principally as result of higher output in Saudi Arabia, Kuwait, and Venezuela.

The increase over the previous month amounted to 222,400 bbl. daily, or 3.9 per cent. Non-Communist foreign crude production averaged 5,875,500 bbl. daily. As compared with May 1953, this total was 487,700 bbl. daily, or 9.1 per cent, higher.

Because of a drop in the United States, the total Free World increase was only 78,500 bbl. daily. The daily average for the month was 12,346,300 bbl., up 568,600 bbl. or 4.8 per cent over May 1953.

In the United States, the decline in production was the first decrease since the previous December. Domestic output in May averaged 6,470,800 bbl. daily, off 143,900 bbl. daily, or 2.2 per cent, from the previous month.

For the first five months of 1954, Free World production averaged 12,190,900 bbl. daily. United States output for this period was about 6,442,000 bbl. daily, while the non-Communist foreign production came to 5,749,000 bbl. daily.

Saudi Arabia record . . . Among the outstanding production developments during the month was the new all-time high in Saudi Arabia of 1,026,791 bbl. daily. This established a new production record for a Middle East country, exceeding the 1,012,179 bbl. daily which Kuwait averaged in March.

For Arabian American Oil Co., it was the first time output has gone above the million-barrel daily mark. Among the factors contributing to the production record was the completion of Separator Plant 1 in the Shedgum section of Ghawar field, and the construction of the Qatif-Ras Tanura pipe line No. 2. The new line added about 30,000 bbl. daily to the company's shipping capacity.

For the first five months of the year, Aramco's production in Saudi Arabia averaged 967,700 bbl. daily. Production in Kuwait during the same period amounted to 899,000 bbl. daily. This reversed the situation in 1953 when Kuwait averaged 861,400 bbl. daily to push Aramco, with 844,600 bbl. daily, out of first place in the Middle East.

New high in Iraq . . . Production in Iraq hit a record 624,400 bbl. daily in May, topping the previous record of 609,200 bbl. daily in September 1953. Much of the increase was due to higher production in Zubair field which averaged 95,400 bbl. daily as compared to 64,200 bbl. daily in May 1953. On May 30, production from the field hit a single-day record of 121,200 bbl. Earlier in May, Basrah Petroleum Co., Ltd., completed the third separator station in the field. Thirty-seven wells now have been completed in Zubair. Seven wells were connected initially to the new separator station which has an 80,000 bbl. daily capacity. In newly discovered Rumalia field, 20 miles to the west, the company has three rigs running and expects to complete a separator station early in 1955.

The higher output in several individual countries in the Middle East brought total production for the region up to 2,766,000 bbl. daily, just under the March level which was a new record. For the first five months of the year, Middle East production averaged 2,643,500 bbl. daily.

Venezuelan production in May

TREND OVER THE LAST YEAR

1953—	W. Hemisphere less U. S.	Middle East	Total non-Communist foreign
June	2,459.4	2,536.0	5,450.1
July	2,487.7	2,534.0	5,471.9
August	2,443.3	2,489.0	5,387.3
September	2,485.7	2,416.4	5,345.3
October	2,519.5	2,528.1	5,511.5
November	2,651.9	2,341.7	5,471.6
December	2,711.9	2,540.2	5,714.1
1954—			
January	2,682.8	2,491.2	5,636.4
February	2,703.7	2,550.6	5,695.3
March	2,642.9	2,767.6	5,872.7
April	2,565.1	2,642.0	5,653.1
May	2,644.8	2,766.0	5,875.5

CRUDE-OIL PRODUCTION

(Daily average in thousands of barrels)

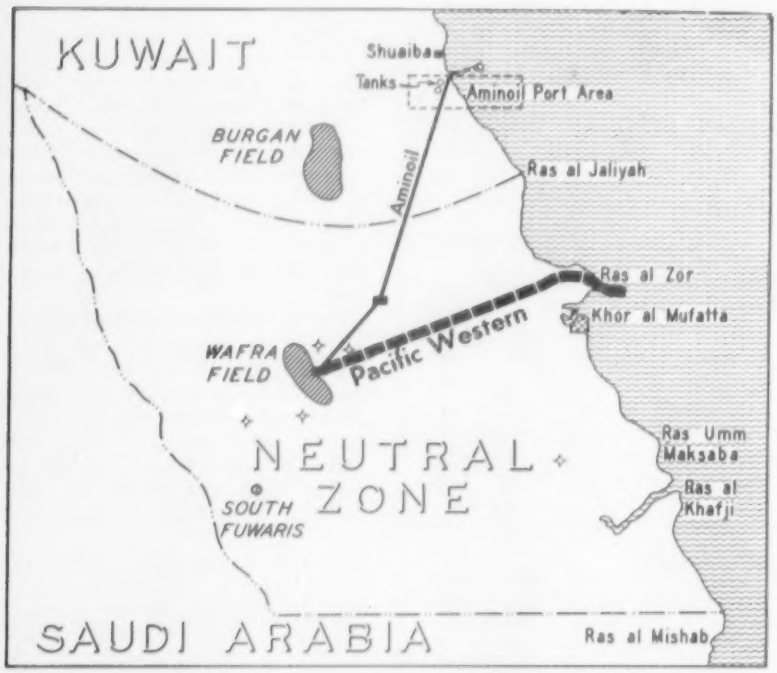
Country—	May 1954	April 1954	May 1953
W. Hemisphere:			
Argentina	83.0	81.2	77.3
Bolivia	3.2	3.4	1.3
Brazil	2.1	2.1	2.5
Canada	227.6	179.2	197.8
Chile	4.5	4.5	3.1
Colombia	112.2	111.3	105.5
Cuba	0.1	0.1	0.1
Ecuador	8.3	8.2	8.2
Mexico	227.0	235.0	177.6
Peru	47.8	47.1	44.6
Trinidad	64.6	63.8	62.0
Venezuela	1,865.0	1,829.2	1,739.2
Total	2,644.8	2,565.1	2,418.6
W. Europe and Africa:			
Algeria	1.7	1.7	1.8
France	8.3	7.2	7.1
Fr. Morocco	2.6	2.6	2.1
W. Germany	50.4	49.6	41.8
Italy	1.5	1.6	1.9
Netherlands	18.4	17.5	16.2
Egypt	38.5	38.9	46.7
United Kingdom	1.2	1.2	1.2
Total	122.6	120.3	118.7
Middle East:			
Bahrain	30.1	30.1	29.9
Iran	36.7	47.9	32.0
Iraq	624.4	606.5	584.3
Kuwait	937.0	900.4	899.4
Neutral Zone	14.0	4.0	. . .
Qatar	96.4	97.8	90.2
Saudi Arabia	1,026.8	954.6	887.4
Turkey	0.6	0.7	0.3
Total	2,766.0	2,642.0	2,523.7
Other Asia:			
British Borneo	99.0	98.8	98.3
Burma	3.5	3.5	2.5
India	6.8	6.8	6.0
Indonesia	212.0	196.8	205.4
Japan	5.6	5.7	5.9
New Guinea	12.7	12.1	4.7
Pakistan	2.5	2.0	4.0
Total	342.1	325.7	326.8
Non-Communist foreign	5,875.5	5,653.1	5,387.8
United States	6,470.8	6,614.7	6,389.9
Total free world	12,346.3	12,267.8	11,777.7
Est. Russia & E. Europe:			
Russian occupation zone of Austria	62.0	62.0	60.0
Romania	110.0	110.0	95.0
Russia	1,135.0	1,135.0	1,035.0
Other Communist	34.1	34.1	31.1
Total	1,341.1	1,341.1	1,221.1
World total	13,687.4	13,608.9	12,998.8

Figures are from reliable reports in the industry or official government sources. Data for Russia and eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these regions. Estimates also have been made for certain other countries, particularly in Southeast Asia, for which completely current reports are lacking. Iranian production shown is net output, or the gross less recycled material. Other Communist includes China and Yugoslavia as well as the Soviet satellite countries in Europe.

showed an increase for the first time since last December when output hit a record 1,935,200 bbl. daily. May output was 1,865,000 bbl. daily, and the average for the first five months amounted to 1,876,200 bbl. daily. Most of the increase in May over April was accounted for by Creole Petroleum Corp., whose production rose from 748,858 bbl. daily in April to 793,064 bbl. daily in May.

In France, May production figures reflected for the first time oil output from the new Esso discovery at Parentis in the southwest. During the month, the company produced 4,725 tons, or about 34,700 bbl. considering the 33°-gravity of the crude. Another discovery has been made at Ragusa, Sicily, by Gulf, but this production was not expected to start until June or July.

West Germany gains steadily . . . Crude oil production in West Germany topped the 50,000 bbl. daily mark for the first time. The increase represented a continuation of the steady gains in oil output which have occurred in West Germany the last six years. The West German producing industry has a target this year of 2,500,000 tons, equivalent to about 48,500 bbl. daily.



Work Starts on Terminal

Pacific Western building crude outlet in Neutral Zone following dispute over use of present pipeline system

PACIFIC WESTERN OIL CORP. is building a new oil-shipping terminal on the coast of the Saudi Arabia-Kuwait Neutral Zone to handle its share of Wafra field production.

The terminal will be named "Mena Saud" after the king of Saudi Arabia. The earlier terminal completed by American Independent Oil Co. last December on the adjoining section of the coast in Kuwait was named "Mena Abdulla" in honor of the present ruling shaikh of Kuwait *(The Oil and Gas Journal, June 28, page 98).*

Pacific Western has contracted with Chicago Bridge & Iron Co. to erect the tanks and engaged Middle East Contracting Co. to lay the line. Construction is under direction of W. W. Mitchell, who has been loaned to Pacific Western by Tide Water Associated Oil Co.

The 10-in. pipeline will extend north and east to a point on the coast of the Neutral Zone known as Ras Az Zor. A single 20-in. submarine line will be laid 9,000 to 10,000 ft. out from the shore to reach the necessary water depth. Pacific Western also is establishing a camp for its Neutral Zone operations.

Earlier arrangement opposed . . . Shortly after the Wafra field discovery was made in April, 1953, the two concession holders—Pacific Western for Saudi Arabia's undivided half, and American Independent, or Aminoil, for Kuwait's half—arranged for Aminoil to ship Pacific Western's share of the production out through the new Aminoil line leading to the terminal in Kuwait.

This arrangement met opposition from the Saudi Arabs. After lifting one tanker load, Pacific Western was reported to have been barred from further export shipments through the Aminoil line to Kuwait. This occurred last February, and while the prohibition was later modified, according to industry sources, the company undertook the construction of its own line as quickly as possible.

One of the clauses of the Pacific Western concession contract with Saudi Arabia declares that the company is not permitted under the concession to have any pipeline outside the Neutral Zone. "The government retains the right," the clause reads, "to grant to any company operating outside the Neutral Zone permission to lay pipelines for transporting oil across this area to the coast, provided that any company or companies to whom such permission is given shall not operate in any manner so as to interfere with the operations of the company in districts where the company is working."

Wildcat watched . . . Although Wafra field development is moving ahead rapidly, current interest centers on a wildcat well which Pacific Western and Aminoil are drilling at the south Fuwaris location. The hole is to be taken into and below the Burgan sands. One hope is the discovery of crude which will be higher in gravity than the 24° Wafra field oil. One of the five dry wildcats in 1950-52, preceding the Wafra discovery, was Fuwaris 1, abandoned at 9,398 ft.

Production from Wafra field is now approximately 30,000 bbl. daily. From January 13, when the first commercial shipment was made from Mena Abdulla, to mid-July, a total of 2,150,000 bbl. was shipped on behalf of Aminoil and Pacific Western. These deliveries have been made to Japanese, United States, and European ports.

The other Neutral Zone rig working on field development recently completed Wafra 18, giving the field 15 producers following No. 4, the original discovery. Present plans are to drill up to and including No. 23 in the Wafra area. The wells have been drilled on a half-mile spacing, leaving the possibility of in-filling on a quarter-mile pattern later if warranted.

Cuban Plans Revealed

Cuban American schedules first wildcat by September 10; Deep Rock, Sterling to join in search of 5,200,000 acres

THE crude in Cuba's Jatibonico wildcat discovery last week lured three American companies into a search for oil on the Caribbean Island that has so far been dominated by Cuban nationals.

Cuban American Oil Co., a new firm, part Cuban and part North American, will spud its first wildcat by September 10.

This announcement was followed closely by another that Deep Rock Oil Corp. and Sterling Oil of Oklahoma, Inc., both of Tulsa, will conduct a joint exploration and development program on approximately 5,200,000 acres of Cuban concessions.

A spokesman for the Grady Vaughn-Herbert W. Klein interests, part owners of Cuban American, said in Dallas last week that a rig and crew of Dixie Drilling Co., a Vaughn-Klein concern, will be shipped to Cuba late this month. The portable rig was especially designed for the job by Ideco. It is capable of drilling to 10,000 ft. and also is suitable for shallow work.

Locations . . . The locations of the first tests by the two organizations have not been determined.

Deep Rock-Sterling announced geological studies are under way to determine the locations of initial wells. The combine will start drilling later this year.

W. H. Cardwell, chief geologist for the Vaughn interests, is scheduled to leave this week to spot the Cuban American location.

Cuban American has had two surface exploration parties active in Cuba since the firm was organized following an agreement reached in June with Trans-Cuba Oil Co. and Cuban-Venezuelan Oil Voting Trust, both Cuban national companies. This agreement provides that Cuban American put up $1,500,000 risk capital and drill 40,000 ft. of hole in Cuba *(The Oil and Gas Journal, June 21, page 130)*.

Under this agreement, the company has selected 750,000 acres from 17,000,000 acres controlled by Trans-Cuba and the Voting Trust. It will own 50 per cent working interest in any developed production. The company also holds an option to select another 750,000 acres within a year from spudding the first wildcat.

Acreage selected . . . About one-third of the acreage selected by Cuban American is in Cuba's eastern basin, the remaining two-thirds in the central basin. A large portion of the acreage surrounds the 25,000-acre block in which possibly important oil production was discovered by the Jatibonico wildcat near the Las Villas and Camaguey province boundary line earlier this year *(The Oil and Gas Journal, May 10, page 90)*.

The producing formation in this well has not been identified, but is believed to be of Cretaceous age.

A Vaughn official said the Cuban American test will be the rankest kind of wildcat. There is no way of knowing how deep sediments are in the area, thus how deep the first test will go. The Jatibonico success, he said, encountered good sedimentary section at 3,500 ft.

Deep Rock-Sterling deal . . . The Deep Rock-Sterling search will be made on land Sterling acquired early this year from Caribbean Petroleum Associates, Inc. The latter firm completed a 3-year geological study of the island.

The concessions are located in several blocks, with the majority of the land in three areas.

About 4,000 square miles are located in Habana province on the western end of the island. This block extends into the Gulf of Databano and southward to the Isle de Pinos. The second largest block includes 2,000 square miles. It is located in Camaguey province with the northern boundary of the block near the city of Camaguey. This block also extends offshore.

A third block is located in Oriente province and includes about 1,600 square miles. The remainder of the concessions total about 100 square miles and are located in Las Villas and Mantanzas provinces.

W. H. Garbade, Deep Rock president, said his firm has acquired 50 per cent interest in the concessions. Garbade said the Cuban program is the first major project under Deep Rock's stepped-up exploratory program.

Australian Well Dry

Australian oil stocks tumbled nearly $63 million last week less than an hour after the announcement that the first well to follow the Rough Range discovery has failed to yield production.

Rough Range 2, located about 1½ miles southwest of the discovery and near the surface crest and the seismic axis, recovered only salt water in the first formation found productive in the earlier well. The discovery tested around 550 bbl. daily at 3,605-20 ft., but No. 2 recovered only salt water in an open hole test of 3,771 ft. The first well has had other shows at 9,789 ft., but has not been able to make a satisfactory test of the deeper formation.

J. W. Thomas, manager of West Australian Petroleum, Ltd., said results of the second well will cause revision of future drilling plans. West Australian, owned 80 per cent by Caltex and 20 per cent by the Australian company, Ampol Exploration, Ltd., had locations staked for the third and fourth wells at Rough Range.

Cabinet vote, new bill indicate . . .

. . . Chile to Drop Oil Monopoly

CHILE may become the latest of the growing group of countries to abandon an official state monopoly in oil exploration and production.

In a surprise move, the Chilean Cabinet decided to open up the country to foreign oil capital. The minister of mines in the government is drafting appropriate legislation which is due to be presented to the Congress in the near future.

The decision was based on Chile's own lack of sufficient capital and resources for widespread and rapid oil development. The same considerations have in the last 2 or 3 years led to a reversal of government oil policy in Peru, Turkey, and Argentina.

Exploration and production in Chile are carried out exclusively by Empresa Nacional del Petroleo, a government organization affiliated with Corporacion de Fomento de la Produccion. Using United States geophysical and drilling contractors, the government group discovered oil in 1945 in the Tierra del Fuego region on Chile's southern tip.

There are now some eight producing fields with an output (in May) of 4,500 bbl. daily. E.N.A.P. has been operating one rig on development and five on exploration. To the end of 1953, a total of 122 wells had been drilled, of which 53 were oil producers, 25 gas, and 44 dry.

Shell's "Miracle Mile"—A new method of

Fig. 1 — These meters, each nominally rated at 1,850 bbl. per hour, are being operated successfully at 2,700 bbl. per hour in conjunction with the prover section.

Proving High-Capacity Pipeline Meters

by R. E. Speckmann and M. L. Barrett, Jr.

THE trend toward larger pipelines with very high rates of flow and the increased use of flow meters creates a problem of how to prove and calibrate meters operating at flow rates of 3,000 to 8,000 bbl. per hour and greater.

Conventional methods of proving meters involve the use of prover tanks and flying switches. These devices give good results at comparatively low flow rates, but they impose considerable strain on pipeline equipment and operation at the new higher flow rates. They also give results of dubious accuracy.

This problem is accentuated in the light of the financial importance of accurate measurement and its interdependence on dispatching, batching, and operating precision. The manufacturers of positive-displacement meters are responding with high-capacity meters designed to measure flows of approximately 3,000 bbl. per hour with a precision intended to equal that of smaller meters which have been known to us for years. Such large meters enable simpler, more compact metering installations which require fewer valves, fittings, and appurtenances. The initial capital cost per barrel of throughput is reduced considerably. Experience to date indicates that we can reasonably expect maintenance costs per barrel of throughput to be cut in half.

Operating labor will not be increased, and the intricacies of measurement and meter-factor applications certainly are reduced. The result is that there is a trend toward the use of one or more large meters as the measuring medium on a pipeline instead of many smaller ones in battery form. The expectation is that the foregoing benefits will and can be realized.

The "miracle mile" . . . Shell Oil Co. has inaugurated and operated for about a year a high-capacity meter-proving system which is a rather radical departure from previously established methods, yet which it feels embodies the basic fundamentals of practice leading to a very high degree of measurement accuracy as advocated in A.P.I. Code 1101.

This procedure has been variously dubbed by operating personnel as the "miracle mile," "measured mile," and "murderous mile." For the purpose of this paper it will be called the "pipeline meter-prover section."

Present installations of such a system are on Shell's 14-in. Wood River, Ill., to Argo, Ill., and East Chicago, Ind., line at the input and terminus ends, and ultimately will handle 125,000 bbl. per day. The most recent installations are at the input and terminus ends of the 16-in. Wolverine Pipe Line Co. system from Hammond, Ind., to Detroit and Toledo, where a total of seven such meter-prover sections are to be operated on an ultimate rate of 175,000 bbl. per day.

Fig. 1 shows a typical installation of the meters on Shell's North line. They are of a type rated by the manufacturer at a capacity of 1,850 bbl. per hour, and Shell is optimistic in its opinion that they can be operated quite successfully at approximately a 50 per cent higher flow rate. They presently are being operated at rates in the neighborhood of 2,700 bbl. per hour.

The meter-prover section is an integral part of the trunk pipeline and is supplemented by scraper launching and receiving facilities as shown in Fig. 2, a schematic of a prover section downstream of a pipeline meter station.

Scraper barrels are constructed of standard-weight oversize line pipe, quick-coupling end fittings, launching-barrel nozzles for dispatching scrapers, and receiving-barrel nozzles to accommodate the incoming stream flowing past a trapped scraper. The scraper

Authors are with Shell Oil Co., at East Chicago, Ind., and New York City, respectively. Portion of paper presented to the fifth annual spring products pipeline conference under auspices of the A.P.I.'s Division of Transportation, Warwick Hotel, Philadelphia, May 10, 1954.

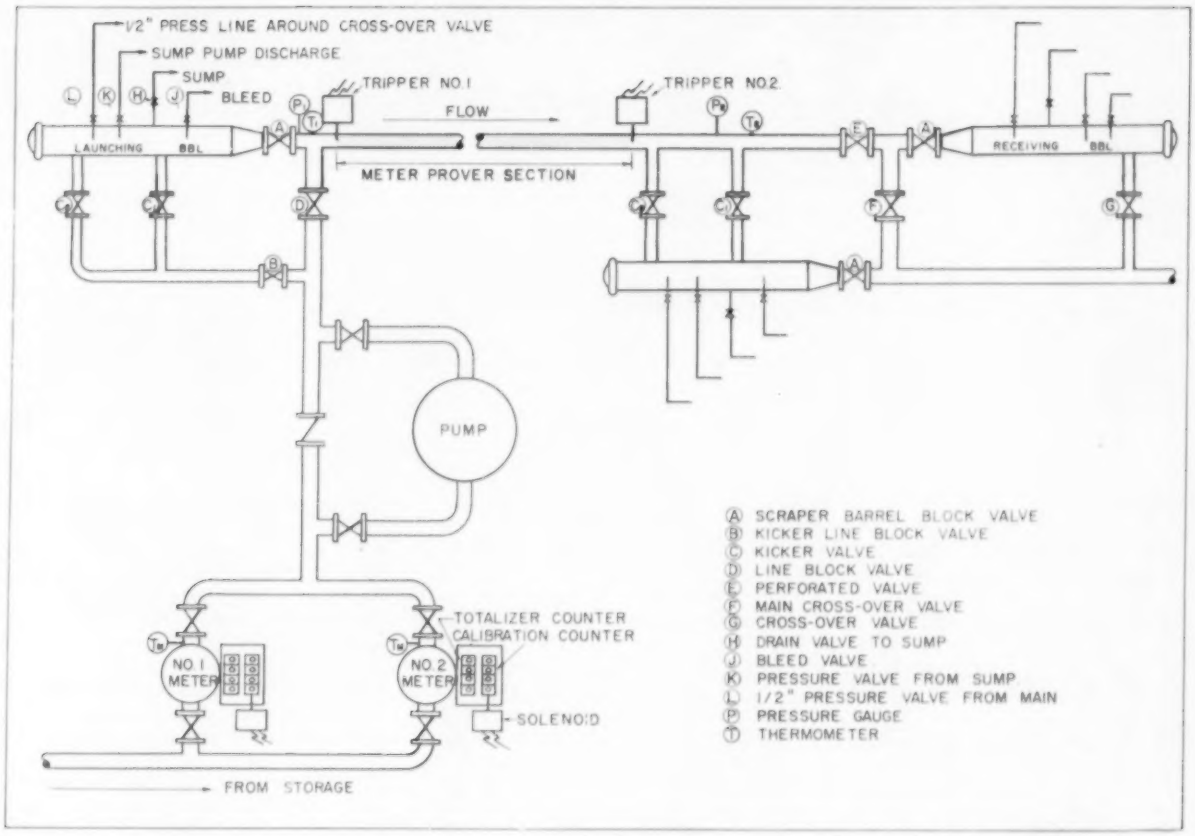


Fig. 2—Typical meter-prover section downstream from meter. Scraper barrels are an integral part of the installation.

block and main-line crossover valves are through conduit gates, whereas the valves on the kicker and bypass lines are venturi-type plugs.

Shell has two prover sections in 8-in. line which have volumes of 50 and 470 bbl.; three prover sections in 14-in. line which have volumes ranging from 800 to 2,540 bbl.; and seven prover sections in 16-in. line which have volumes ranging from 780 to 9,858 bbl.

The sizes of the prover sections were primarily dictated by the availability of sites for the location of the scraper launching and receiving-barrel installations at the points remote from the meters. It is felt that a workable size for the meter-proving section would be about one-tenth of the normal flow in barrels per hour through the meter or meters to be proved. In no case should its capacity be less than 10,000 times the least reading of the meter register in order to enable determination of registered quantities to within 0.01 per cent. As with any other proving procedure, as the prover volume is increased, fringe errors are minimized.

Careful construction . . . Care was exercised in the construction of both of the large pipelines mentioned to insure the absence of internal projections of welding icicles, sharp inside-diameter transitions, and other projections, for the entire length of the lines. An internal-lineup clamp, equipped with a tight-fitting copper cylindrical shoe, was used at welds. This is considered essential in the construction of a pipeline prover section, as well as the elimination of excessive bends and any other internal features which might in any way disrupt the uniform passage of a scraper through the prover section of line pipe.

Trips are fixed to each end of the prover section to indicate scraper passage through the section. Fig. 3 is a schematic diagram of the scraper indicator employed. It consists of a vertical finger extending down into the bore of the line and pivoted in a pressure-tight housing welded to the pipe. A torque-tube assembly located horizontally in the housing is employed to transmit the horizontal-displacement motion of the finger to a rotary motion outside the housing without the use of a stuffing box.

The torque tube consists of a thin-walled tube capable of withstanding the maximum line pressure without collapsing and a drive shaft free to turn within. The outer end of the tube is sealed to the housing, and the inner end is sealed to the drive shaft and secured to the finger. A scraper contacting the finger will cause it to rotate upward into the housing, allowing the scraper to pass. Rotation of the finger effects a like rotation of the drive shaft to actuate the control circuit through the tilting-type mercury switch.

Each meter is equipped with a register comprising two counters. Refer to Fig. 4 for schematic diagram. The totalizer counter runs continuously to record the cumulative total flow of fluid passing through the meter, and is used for all hourly readings and accounting records. The calibration counter automatically is enclutched and declutched to exactly record the barrels registered to displace the calibration scraper between trips. The calibration counter is clutched into the register gear train by action of the initial trip's energizing the solenoid, and a spring return provides for disengagement when the second trip breaks the control circuit.

The scrapers presently used consist of multiple tight-fitting, relatively soft rubber disks or cups of approximately ¼-in. larger diameter than the pipe bore to provide effective sealing and to make negligible the amount of slip-

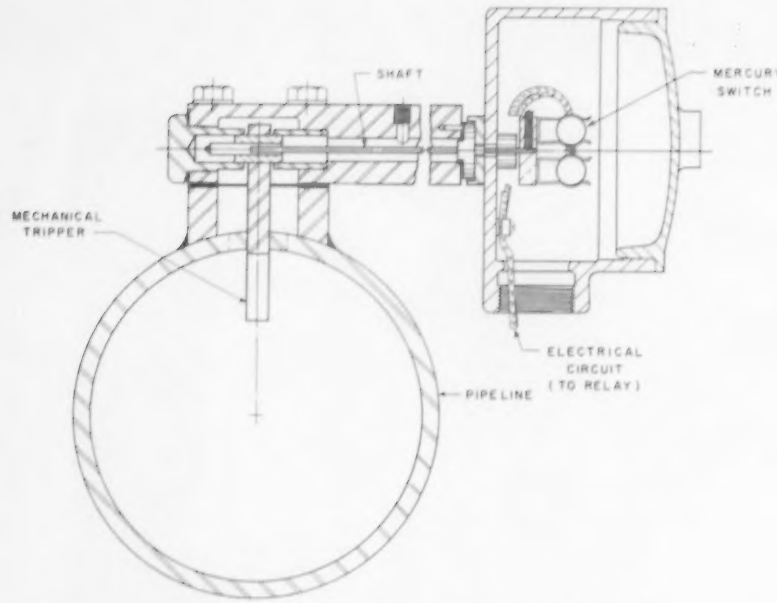


Fig. 3—Mechanical scraper detector which is placed at both ends of the prover section.

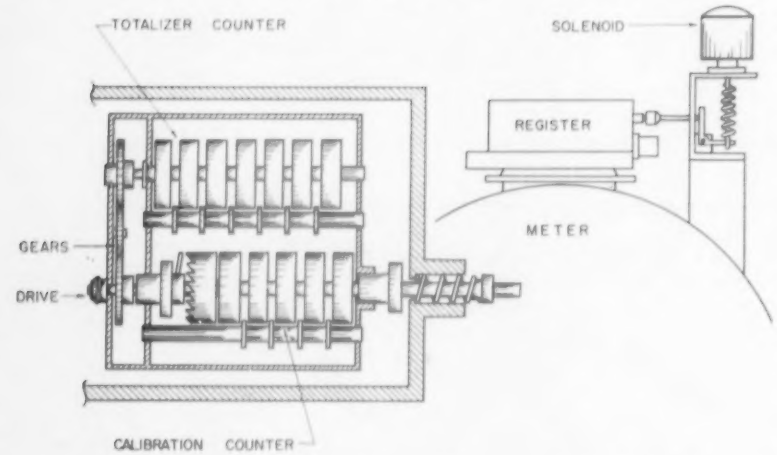


Fig. 4—Solenoid-actuated meter register and clutching mechanism to start and stop counter.

page past the scraper. Development work is now in progress to evaluate the effectiveness of several other types of scrapers. A dumbbell type, using single disks or cups mounted on each end of a center shaft, seems to possess considerable merit because it is less cumbersome to handle and less costly to maintain.

Electrical circuit . . . Fig. 5 illustrates the electrical control circuit which automatically enclutches and declutches the calibration counters. At the scraper-launching end of the prover section, the scraper indicator has attached to it a normally open mercury-type tilting-tube switch which makes the circuit on passage of a scraper. A similar switch, normally closed, is fixed to the downstream indicator, and opens the control circuit on scraper passage. Pilot lights at the meters indicate the presence of a scraper in the prover section. By use of motor-operated valves and pressure and temperature-telemetering equipment at the remote scraper station, it would be possible to execute the test run from the metering location.

Thus the only attendance requirement at the remote station would be to insert or remove the scraper some time prior to or after the proving, as the case may be. Telephone communication between the two points is a nicety, but is not a prerequisite for efficient operation.

Maximum throughput on large-diameter lines may require the operation of several meters in parallel. To obtain meter factors, all required meters are run while proving. By totaling the indicated barrels from the calibration counters, a combined-station meter factor is obtained. This factor is valid as long as the percentage of total flow passing through each meter remains essentially constant.

Initial Calibration of Prover Section

Determination of the volumetric capacity of the meter-prover section is a precision calibration job, and must be undertaken only by competent personnel. All subsequent meter proofs made at the location can be no better than the initial calibration of the prover section. Shell has used the master-meter method to establish this line-section volume. Experience has proved that mathematical calculation of the volume of the section is not sufficiently accurate.

A skid-mounted meter unit with maximum capacity of 2,100 bbl. per hour was constructed, utilizing three 4-in. positive-displacement meters with necessary headers and valving so that one, two, or three meters can be run in parallel. In addition, either of the two meters may be operated in series with the third for proving, if required, by meter repairs being made in the field. All registers have totalizer and calibration counters. The individual meters are proved against a standard open-type stationary 1,000-gal. prover tank previously checked with National Bureau of Standards certified test cans. Test runs are made with No. 3 fuel oil (0.85 sp. gr. at 60° F.) at 300, 400, and 500 g.p.m. and accuracy curves are plotted.

The unit is manifolded into the station piping in series with the operating meters. Register solenoids are tied into the control circuit so that all calibration counters will be actuated by scraper movement past the trips. Before the calibration is started, it may be necessary to adjust the throughput so that the 2,100-bbl. per hour rate of the test unit is not exceeded. Then, with the full stream going through the test meters, a calibration scraper is launched and moved through the prover section into the receiving barrel. By noting the opening and closing calibration-counter readings, and by applying the meter factors at the operating conditions along with temperature and pressure-correction factors (explained later herein), the capacity of the pipeline between the scraper indicators is determined. Several runs are made and averaged to establish the capacity of the prover section. This is the adjusted volume of the prover section, with pipe temperature of 60° F. and at atmospheric pressure. Because the same type of scraper is used for prover calibration and meter testing, possible slippage past the scraper is automatically washed out

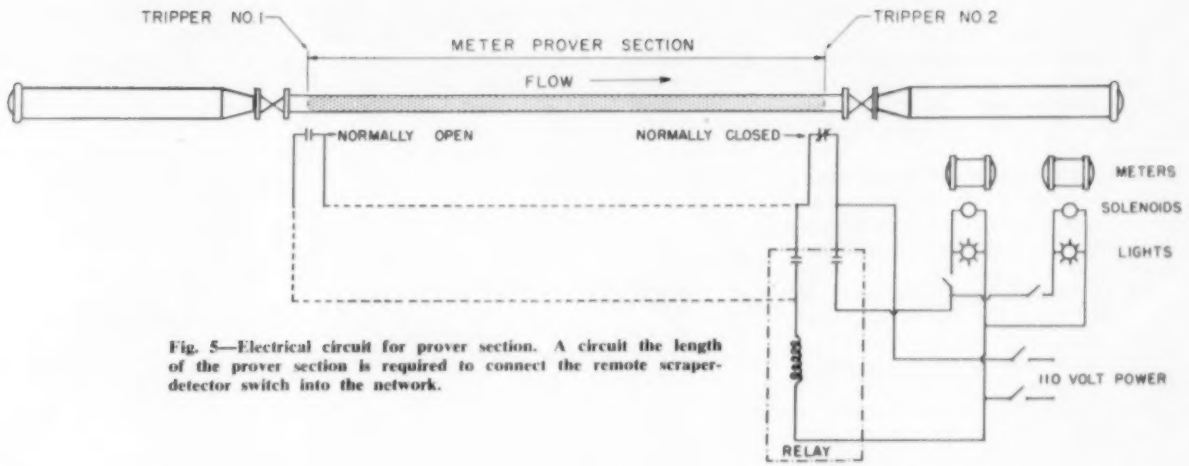


Fig. 5—Electrical circuit for prover section. A circuit the length of the prover section is required to connect the remote scraper-detector switch into the network.

and so will not influence meter accuracies.

Typical operation . . . Fig. 2 illustrates the physical alignment of equipment for a meter station with pipeline-prover section downstream. We will assume that the flow rate is such that the entire stream may be handled through one meter. Block valves on the standby meter and all drain valves are lubricated to insure that all fluid passes through the operating meter to displace the scraper through the prover section. A scraper is inserted in the barrel, and the barrel is filled with liquid.

After the valving has been lined up for scraper receipt at the remote location, a pressure drop is created across the scraper to move it into the line. When the scraper contacts tripper No. 1, the calibration counter is engaged. At this point in the run the prover volume is zero and the reading on the calibration counter is the opening meter reading. During the period of the run, all liquid which goes through the meter displaces an equal amount from the intermediate piping, which liquid moves into the prover section behind the scraper. When the scraper hits tripper No. 2 and breaks the electrical circuit, the prover section (tank) is full and the calibration counter automatically is stopped.

After scraper receipt, the barrel is isolated, drained to sump, and the scraper is removed. To protect product specifications, all sumps are operated "dry"; therefore, drainups immediately will be pumped back into the line. The following data, accumulated during the meter proof, will enable the operator to calculate the meter factor:

1. Initial and final calibration-counter readings.
2. Temperature of registration.
3. Average prover pressure and temperature determined with prover section full of test fluid.
4. Elapsed time of run.

A similar procedure is followed for meter testing with prover section upstream.

In collecting data and making calculations the following units and accuracies will be adhered to:

1. Volumes are determined to the nearest hundredth of a barrel.
2. Temperatures are determined to the nearest tenth of a degree Fahrenheit.
3. The temperature to which measurements are to be corrected is 60° F.
4. Pressures are determined to the nearest 5 psig. The standard pressure to which all measurements will be corrected is atmospheric pressure or the saturated vapor pressure of the liquid at 60° F., whichever is higher.
5. All correction factors to the nearest 0.01 per cent.

There follows an explanation of entries listed on the calibration report, the formula required, and a sample calculation:

1. Closing meter reading: calibration-counter reading at completion of run.

2. Opening meter reading: calibration-counter reading at start of run.

3. Registration (G): Closing meter reading minus opening meter reading.

4. Temperature of metered stream, °F. (T_m).

5. Factor for meter temperature (F_{mt}): correction factor for change in meter registration with change in meter temperature. This factor is obtained from Table 6, "Reduction of Volume to 60° F. Against A.P.I. Gravity at 60° F." of the A.S.T.M.-I.P. Petroleum Measurement Tables.

6. Corrected registration (V_2): volume registered by the meter corrected to 60° F.

7. Upstream and downstream prover pressures: pressures obtained at the No. 1 and No. 2 trippers when the section is full of test liquid.

8. Upstream and downstream prover temperatures: temperatures obtained at the No. 1 and No. 2 trippers when the section is full of test liquid.

9. Average prover pressure: arithmetic average of No. 1 and No. 2 tripper pressures.

10. Average prover temperature: arithmetic average of No. 1 and No. 2 tripper temperatures.

11. Base prover volume (K): prover-

TABLE 1—F_{pp}* = CORRECTION FACTOR FOR CHANGE IN PROVER VOLUME WITH CHANGE IN PRESSURE

P = average pressure of pipeline-prover section
P_s = standard pressure
= 90 psig. for propane
= 10 psig. for butane
= 0 psig. for other products pumped

$P - P_s$	F_{pp} for 8-in. pipe	F_{pp} for 14 and 16-in. pipe
0	1.0000	1.0000
100	1.0001	1.0002
200	1.0002	1.0003
300	1.0003	1.0005
400	1.0004	1.0006
500	1.0004	1.0008
600	1.0005	1.0009
700	1.0006	1.0010
800	1.0007	1.0012
900	1.0008	1.0013
1,000	1.0009	1.0015
1,100	1.0009	
1,200	1.0010	

*Calculated from hoop tension induced in pipe by internal pressure $P - P_s$.

TABLE 2—F_{pt}* = CORRECTION FACTOR FOR CHANGE IN PROVER VOLUME WITH CHANGE IN TEMPERATURE

Temp. (°F.)	F_{pt}
20	0.9992
30	0.9994
40	0.9996
50	0.9998
60	1.0000
70	1.0002
80	1.0004
90	1.0006
100	1.0008
110	1.0010
120	1.0012

*A.P.I. Code 1101, Sec. 3024.

section capacity at 60° F. and at atmospheric pressure.

12. Factor for prover pressure (F_{pp}): Correction factor change in prover-section dimensions with change in pressure. The factor is obtained from Table 1.

13. Factor for prover temperature (F_{pt}): correction factor for change in prover-section dimensions with change in temperature. The factor is obtained from Table 2.

14. Factor for liquid pressure (F_{lp}): correction factor for change in volume of test liquid with change in pressure.

15. Factor for liquid temperature (F_{lt}): correction factor for change in volume of test liquid with change in temperature. The factor is obtained from Table 6 of the A.S.T.M.-I.P. Petroleum Measurement Tables.

16. Net prover volume (V_1): The net volume measured in the prover section and obtained by correcting the base volume for changes in prover dimensions with pressure and temperature and changes in the volume of the test liquid with changes in pressure and temperature.

17. Time scraper received.

18. Time scraper launched.

19. Elapsed time of run.

20. Rate of flow, barrels per hour.

21. Meter case pressure.

22. Meter factor: the net prover volume divided by the corrected meter registration.

Formulas Used for Calculations

$$V_1 = (K)\ (F_{pp})\ (F_{pt})\ (F_{lp})\ (F_{lt}) \quad (1)$$

Where:

V_1 = net prover volume.

K = base prover volume.

F_{pp} = correction factor for change in prover-section volume with change in pressure.

F_{pt} = correction factor for change in prover-section volume with change in temperature.

F_{lp} = correction factor for change in volume of test liquid with change in pressure.

$$= 1 + (P - P_s)\ (a) \times 10^{-6}$$

Where:

P = average pressure of prover section.

P_s = standard pressure.

= 90 psig. for propane.

= 10 psig. for butane.

= 0 psig. for all other products.

a = compressibility factor per psi. from Table 3.

F_{lt} = correction factor for change in volume of test liquid with change in temperature.

$$V_2 = (G)\ (F_{mt}) \quad (2)$$

Where:

V_2 = corrected meter registration.

G = indicated meter registration.

F_{mt} = correction factor for change in meter registration with change in temperature.

$$f = \frac{\text{Net prover volume}}{\text{Corrected meter registration}} \quad (3)$$

$$= V_1/V_2.$$

Where:

f = meter factor

Sample Calculation

Product = 32.6° A.P.I. No. 3 fuel oil.

P = 1,100 psig. (average prover pressure).

T = 68.9° F. (average prover temperature).

G = 470.24 bbl. (indicated meter registration).

T_m = 56.6° F. (temperature of registration).

K = 459.93 (base prover volume).

P_s = 0 psig. (standard pressure for product being pumped).

F_{pp} = 1.0009 (from Table 1).

F_{pt} = 1.0002 (from Table 2).

F_{lp} = 1.0053 (from Table 3).

F_{lt} = 0.9961 (from Table 6 of the A.S.T.M.-I.P. Petroleum Measurement Tables).

F_{mt} = 1.0015 (from Table 6 of the A.S.T.M.-I.P. Petroleum Measurement Tables).

$V_1 = (K)\ (F_{pp})\ (F_{pt})\ (F_{lp})\ (F_{lt})$.

= (459.93) (1.0009) (1.0002) (1.0053) (0.9961).

= 461.06 bbl.

$V_2 = (G)\ (F_{mt})$.

= (470.24) (1.0015).

= 470.95.

$f = V_1/V_2$.

= 461.06/470.95.

= 0.9790.

Approximately 1 year's experience acquired in the operation of four pipeline-prover sections indicates the following readily obtainable accuracies:

1. Consecutive tests made in the same batch of liquid under similar flow conditions usually check within 0.2 per cent, and rarely exceed 0.05 per cent.

2. Line balances may be maintained within 0.1 per cent of a products pipeline system which employs positive-displacement meters at all input and take-off stations. Shell's East products pipeline for a 7-month period (total throughput of 6,851,062 bbl.) had a net line unbalance of 1,296 bbl. or 0.0189 per cent.

TABLE 3—VALUES OF a, COMPRESSIBILITY FACTOR PER PSI.

°A.P.I. at 60° F. / Observed temp. (°F.)	20	30	40	50	60	70	80	90	100	110	120	130	140	150
20	3.2	3.8	4.5	5.4	6.4	7.8	9.4	11.2	13.3	16.0	19.3	23.5	28.5	34.5
24	3.3	3.9	4.6	5.5	6.5	7.9	9.6	11.4	13.6	16.4	19.7	24.0	29.2	35.3
28	3.3	3.9	4.6	5.6	6.6	8.0	9.7	11.6	13.8	16.7	20.1	24.5	29.9	36.1
32	3.4	4.0	4.7	5.6	6.8	8.2	9.9	11.8	14.1	17.1	20.6	25.1	30.6	37.0
36	3.4	4.0	4.7	5.7	6.9	8.3	10.0	12.0	14.3	17.4	21.0	25.6	31.3	37.8
40	3.5	4.1	4.8	5.8	7.0	8.4	10.2	12.2	14.6	17.8	21.4	16.1	32.0	38.6
44	3.5	4.2	4.9	5.9	7.1	8.5	10.4	12.4	14.9	18.2	21.9	26.7	32.7	39.5
48	3.6	4.3	5.0	6.0	7.2	8.6	10.5	12.6	15.2	18.6	22.4	27.4	33.4	40.4
52	3.6	4.3	5.0	6.0	7.3	8.8	10.7	12.9	15.5	18.9	23.0	28.0	34.2	41.2
56	3.7	4.4	5.1	6.1	7.4	8.9	10.8	13.1	15.8	19.3	23.5	28.7	34.9	42.1
60	3.7	4.5	5.2	6.2	7.5	9.0	11.0	13.3	16.1	19.7	24.0	29.3	35.6	43.0
64	3.7	4.5	5.3	6.3	7.6	9.2	11.2	13.6	16.5	20.2	24.6	30.0	36.5	44.0
68	3.8	4.6	5.4	6.4	7.8	9.4	11.4	13.9	16.9	20.7	25.2	30.7	37.4	45.0
72	3.8	4.6	5.5	6.6	7.9	9.6	11.7	14.2	17.2	21.1	25.8	31.4	38.2	46.0
76	3.9	4.7	5.6	6.7	8.1	9.8	11.9	14.5	17.6	21.6	26.4	32.1	39.1	47.0
80	3.9	4.7	5.7	6.8	8.2	10.0	12.1	14.8	18.0	22.0	27.0	32.8	40.0	48.0
84	4.0	4.8	5.8	7.0	8.4	10.3	12.4	15.2	18.5	22.6	27.7	33.6	41.0	49.2
88	4.1	4.9	5.9	7.2	8.6	10.5	12.7	15.6	19.0	23.2	28.4	34.5	41.9	50.4
92	4.3	5.0	6.1	7.4	8.9	10.8	13.1	16.0	19.5	23.8	29.2	35.3	42.9	51.6
96	4.4	5.1	6.2	7.6	9.1	11.0	13.4	16.4	20.0	24.4	29.9	36.2	43.8	52.8
100	4.5	5.2	6.3	7.8	9.3	11.3	13.7	16.8	20.5	25.0	30.6	37.0	44.8	54.0
104	4.6	5.4	6.5	8.0	9.6	11.7	14.2	17.4	21.2	25.8	31.5	38.0	46.0	55.4
108	4.7	5.5	6.7	8.2	10.0	12.1	14.7	18.0	21.9	26.7	32.4	39.1	47.3	56.8
112	4.8	5.7	6.9	8.5	10.3	12.5	15.2	18.6	22.6	27.5	33.4	40.1	48.5	58.2
116	4.9	5.8	7.1	8.7	10.7	12.9	15.7	19.2	23.3	28.4	34.3	41.2	49.8	59.6
120	5.0	6.0	7.3	8.9	11.0	13.3	16.2	19.8	24.0	29.2	35.2	42.2	51.0	61.0

ACTIVITY BY HUMBLE Oil & Refining Co. at Grand Isle and Timbalier Bay-West Delta areas is swinging into high gear as a large-scale drilling and development program gets under way. Left, a development well being drilled from platform served by converted LST tender. Right: contract crew laying 10½-in. Somastic-coated gathering line from Grand Isle shore out to area platforms.

Humble Probes Louisiana Tidelands

Three wildcats included among company's current operations

by William P. Sterne
Gulf Coast District Editor

ONE of the most concentrated drilling and development programs in the history of the Louisiana tidelands is well under way by Humble Oil & Refining Co. in the Grand Isle-Timbalier Bay-West Delta areas off Jefferson and Lafourche parishes.

By the end of the year, the company will have six or eight rigs running.

Included in this major program are:

. . . **Three wildcat tests,** one each in South Timbalier Block 52, South Timbalier Block 54, and West Delta Block 30 (Pelican Island area). Each is slated to test the Miocene sands to the 14,000-ft. level.

. . . **Fourteen new development wells** in the proven fields in Grand Isle Blocks 16 and 18. Two of the wells are planned to be drilled to 13,000 ft. and the remaining 12 to 8,500 ft. Three of the wells are already under way from template-type drilling platforms.

. . . **Twenty exploratory tests** to determine possibilities for producing sulfur on the salt domes in the area. The 2,500-ft. tests will also be studied for information on subsurface conditions relative to oil and gas production possibilities.

In addition Humble now has under way two 13,000-ft. wildcats off the South Texas coast, which is a part of its over-all $14,000,000 drilling-development program for this year.

. . . **A new 7-mile gathering system** of 10½ and 6-in. pipe, running from the various platforms offshore to the Humble tank battery on the island. The offshore line went into service the first of July.

Activity high . . . Humble currently has 18 drilling platforms offshore (see table). Included are five in Grand Isle Block 16 (formerly known as Caminada Pass); five in Grand Isle Block 18; two in West Delta Block 27 (Tiger Pass); three in West Delta Block 30 (Pelican Island); one in South Timbalier Block 34; and two in South Timbalier Block 52.

Seven new platforms have been installed by the company in the Louisiana and Texas tidelands since early March. These include one each for the wildcat ventures (one is off Texas) and two for development wells.

Highlighting the Louisiana activity are the three wildcat ventures. The South Timbalier Block 52 well was spudded in the latter part of April and operations began in late May on the test in Block 52, South Timbalier, on a platform located 14 miles from land, in about 50 ft. of water. The West Delta Block 30 wildcat in the Pelican Island area, is officially classed by Humble as a "field wildcat." It is about 7.8 miles from shore in 60 ft. of water.

All of the six new platforms are of the same general design, being approximately 75 by 85 ft. Each can handle four or five wells, but they may be extended as necessary to handle any additional wells which might be drilled directionally. The rig on each platform is to be skidded for each new location.

Humble reports that so far (since 1948) it has discovered six possible salt-dome structures off Louisiana.

No stranger offshore . . . The company is certainly no newcomer to offshore drilling. It has been producing from Grand Isle Block 18 since August 1948, and has had considerable experience also off the Texas coast.

The first big undertaking by the company in the Louisiana tidelands got under way in February 1948 when Humble installed what was then the largest offshore platform ever fabricated: a double-decked, completely self-contained structure measuring 106 by

210 ft. This platform, termed Structure "A" in Grand Isle Block 18, has living quarters for the production crew, and contains all separators, tanks, and other producing facilities. It currently contains three producing oil wells, and others can be drilled from it in the future.

The first production was taken from this huge platform in August 1948 and following the discovery, activity jumped quickly, from one drilling rig running, to seven rigs by the end of 1948.

Operations quickly mushroomed from one area to six, covering about 80 miles of coastline from the mouth of the Mississippi River to Timbalier Island.

However, this initial spurt of activity which resulted in Humble's completing a number of oil wells and several gas wells which had to be shut in due to lack of a market, tapered off in 1950 by which time crude production had reached about 2,000 bbl. per day. During the controversy over the ownership of the tidelands, all rigs were moved out and the company's floating fleet was put in mothballs at Orange, Tex.

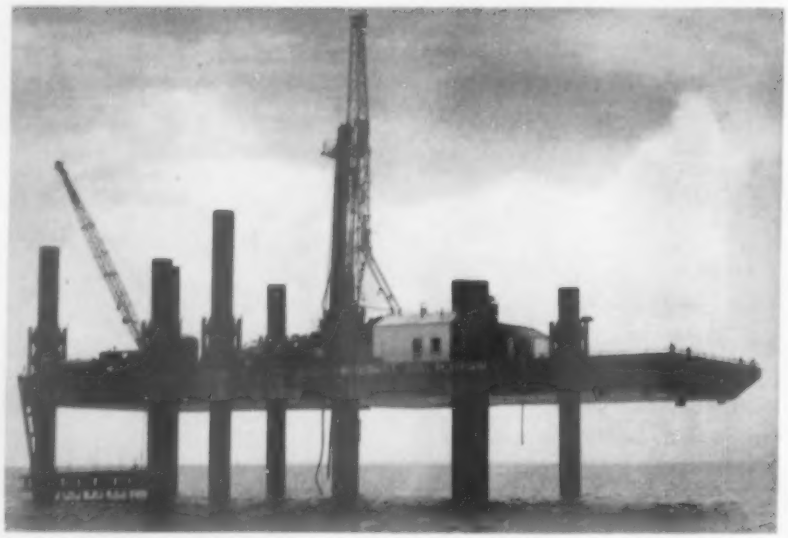
Work renewed . . . Following the congressional action which decided ownership of the tidelands, and the subsequent decision by the Supreme Court upholding the act, Humble resumed work in the Grand Isle-West Delta-Timbalier areas. The first development well was spudded in in April this year.

Platform drilling . . . All of Humble's present offshore drilling is being conducted from the standard-type platform, which is served by a floating tender. The exception to this rule is the program involving the 20 sulfur-exploratory tests. These latter wells are being drilled from a DeLong portable drilling platform.

All of the platforms now in use by Humble are of the template type, and the ones installed since the big structures in Grand Isle Block 18 contain 16 piles, driven through steel caissons. Cathodic protection (magnesium anodes) is used on all of the structures, and a regular painting program has been in effect since 1948 to keep the structures in good condition.

All of the new platforms are a minimum of 40 ft. above the high-water mark to avoid any damage by storms which frequent the Grand Isle area in late summer and fall. One large platform in Grand Isle Block 18, built with a deck level of 30 ft. above high-water mark, is now being raised 10 ft. as an added protection from high seas.

There is from 4 to 20 ft. of silt on the bottom of the ocean in areas where Humble operates, and the piling (steel H-beams or pipe) for the platforms must be sunk to from 100 to 200 ft. into the gulf bottom before the platforms are installed thereon.



DRILLING SULFUR core tests from a DeLong portable platform-barge. Humble plans 20 such tests to locate and evaluate sulfur deposits on the Grand Isle salt domes over the next 2 years. This unit is portable, has 10 legs which sink into the ocean floor for support.

HELICOPTER DECK of converted LST can be seen clearly here. It is mounted atop ship's fantail deck and can accommodate largest helicopters available today.

Humble is running two company drilling rigs in the Grand Isle area, and there are three contractors' rigs which will eventually be used in the work.

Sulfur tests . . . The 20 sulfur-exploratory tests, as mentioned, are being drilled to a maximum depth of 2,500 ft., from a DeLong portable platform. This platform, one of the first to be adapted for Gulf of Mexico drilling use, is 80 by 206 ft., and is 8½ ft. thick. It has 10 legs, or caissons, and when on location sinks these caissons to the bottom of the ocean. When the caissons are in place the platform literally "jacks" itself up out of the water to a safe position above the high-water level.

The barge-platform is highly portable, and it can be lowered to the surface, its caissons pulled, and moved to a new locations in a matter of hours. Currently it is operating in 47 ft. of water.

"Doughnuts" around legs . . . The caissons on this portable platform are each now being fitted with an 18-ft.-long "doughnut," which is 16 ft. in

ONE OF THE LARGEST offshore structures ever built. Humble's first off Louisiana, this big platform, "Structure A" in Grand Isle Block 18, has three oil wells and is completely self-contained. It has living quarters for crews, tankage, separators, other facilities for handling production from other platforms.

diameter. Ballasted, these doughnuts will enable the DeLong barge to be more stable and at the same time prevent the slow settling of the caissons in the ooze of the ocean floor caused by the vibrations from the drilling rig. The doughnuts will add more load-bearing surface to each leg, thus preventing deeper penetration of the caissons. The doughnuts are hooked about 25 ft. above the bottom of the caisson, and have proved to provide much greater stability.

A similar barge platform, which will contain 12 legs, is to be built by DeLong-McDermott, Inc., in the near future. It will be about 90 by 250 ft. by 13 ft. thick and will be capable of drilling in as much as 100 ft. of water.

Drilling tenders . . . Humble has four converted LST's in use off the Louisiana coast at present and two more are to be put into operation shortly. These 300-ft. vessels are ideally suited for tender ships for the permanent-type template platforms now in use. (Humble's tenders are not equipped with their own motive power.) Huge gantry cranes handle pipe, casing, and other heavy equipment.

The ships, in addition to containing all cementing equipment and mud pumps and mud-conditioning tanks, incorporate quarters for the crews and have recreation rooms and other modern conveniences.

Special helicopter landing decks have been incorporated on the afterdeck of each tender.

Platform connection . . . The tender ships have a built-in dolly-track arrangement for the walkway and gangway for drill pipe and casing. This connection to the platform is on a swivel, and the dolly-track arrangement takes both lateral and thrust movements of the shifting tender during heavy seas.

Helicopters . . . Humble was one of the first companies to provide helicopter service for its offshore operations. The landing platforms on the fantail of each tender can accommodate the largest-type helicopters available, and each production platform has been fitted with landing decks for the craft.

Humble is currently using one large eight-passenger ship, which carries drilling crews to and from the distant platforms. A smaller helicopter is used for "hot shot" service to and from the Grand Isle base. They save valuable time and cut costs. For example, a crew-boat ride from Grand Isle to Timbalier Bay areas, about 30 to 40 miles, takes up to 3½ hours. But helicopter flying time is about 30 minutes.

An example of their use is as follows:

The large helicopter, which can carry up to eight men, depending on their weight, takes off every morning from the Grand Isle base. In it are members of the relief drilling crew. The helicopter lands on the fantail of the drilling tender, picks up the drilling crew which has finished its week on board, and is back at the company base at Grand Isle by 9:30 a.m. At 2:30 p.m., out it goes again to Timbalier Bay, picks up another crew, and is back on the ground at Grand Isle by 3:45 p.m.

Each man is required to wear an individual Mae West, and in addition, the helicopter has a built-in Mae West in the forward compartment which will allow the ship, which does not have pontoons, to remain afloat for several hours in event of an emergency landing on the water. A 10-man life raft is aboard at all times. In more than 2 months of continuous operation there has been no mishap of any kind.

The larger helicopter is to be fitted shortly with large rubber pontoons, so that it can land on the tender during rough weather. As of now the ship cannot land on the tender ships except in calm weather, for it is equipped only with back-wheel brakes, and it is impossible to keep the helicopter in position on a tossing deck. Adding of the pontoons will provide further safety for the personnel, as any forced landing at sea would enable the ship to remain afloat indefinitely.

New gathering line . . . The new 7-mile flow line recently put into service runs from the various producing platforms in Grand Isle field to shore at Grand Isle. The line, laid in up to 60 ft. of water, is Somastic coated to prevent corrosion. It was trenched in and silt forms a natural backfill. The line is 10½ in. for the most part, with 6-in. feeders.

Although current production from wells is only about 2,300 bbl. daily, this flow line will have a capacity to move up to 30,000 bbl. per day. It will transport oil, gas, and water to the shore installation where the separators, treaters, and new tankage have been constructed.

Gas wells shut in . . . As of July 1 Humble had nine producing oil wells off Louisiana, with two waiting for producing facilities. In addition there are nine gas wells shut in due to lack of a market. No plans have been announced for any gas line to move this production.

Current oil allowable is 357 bbl. per day per well, and existing wells are producing from the 8,500 and 9,500-ft. level of the Miocene.

Radio facilities . . . Humble has com-

LAY BARGE operates close to starboard side of converted LST tied up to platform in Grand Isle Block 18. New 10½-in. gathering line is Somastic coated to prevent corrosion. It will handle production from offshore wells, moving in to terminal on Grand Isle.

plete radio and radar facilities to keep in touch with the helicopters, crew boats, production, and drilling platforms. Large installations are at Grand Isle headquarters, and a huge tower resembling an oil derrick houses the radar sweeper. The crew boats and helicopters keep in touch with the base at all times, and can relay messages to other boats and platforms through the main shore station.

A modern camp is located on the base properties at Grand Isle. Contained in the camp are 17 company houses, a large mess hall, bachelors' quarters, and recreational facilities.

In addition there are 11 employee-owned houses, built on land which is owned by the company.

Fleet . . . In addition to the four converted LST's now in service and the two now being activated. Humble has a sizable fleet to carry on its operations. This includes three converted crash boats which serve as tugs; three 76-ft. crew boats which are capable of operating in heavy seas; one supervisory boat; and an LCT freight boat.

TABLE 1—HUMBLE OFFSHORE PLATFORMS IN GRAND ISLE DISTRICT

Grand Isle Block 16 (Caminada Pass)
(No. of platforms: 5)

Lease No.	Well No.	Status
799	A-1	Gas production (shut in)
804	A-2	Oil producer (pumping)
803	B-1	Gas production (shut in)
803	C-3	Gas production (shut in)
800	E-1	Gas production (shut in)
799	F-2	Gas production (shut in)

Grand Isle Block 18
(No. of platforms: 5)

801	A-1	Oil producer
798	A-5	Oil producer
802	A-2	Oil producer (off production for workover)
797	B-1	Depleted oil producer (produced for 4 years)
802	C-2	Oil producer*
802	C-3	Oil producer*
802	C-4	Oil producer*
802	C-5	Oil producer*
802	C-6	Oil producer*
802	C-7	Oil producer*
798	D-1	Well drilling
797	E-1	Oil producer†
797	E-2	Oil producer†
797	E-3	Well drilling

*Temporarily shut in while platform is being raised 10 ft. above water level to total of 40 ft. †Awaiting production facilities.

West Delta Block 27 (Tiger Pass)
(No. of platforms: 2)

Lease No.	Well No.	Status
818	A-3	Gas production (shut in)
818	B-1	Gas production (shut in)

West Delta Block 30 (Pelican Island)
(No. of platforms: 3)

819	A-1	Gas production (shut in)
819	D-1	Gas production (shut in)
820	E-1	Platform installed. Rig up for test soon

South Timbalier Block 34
(No. of platforms: 1)

1,027	A-1	Gas production (shut in)

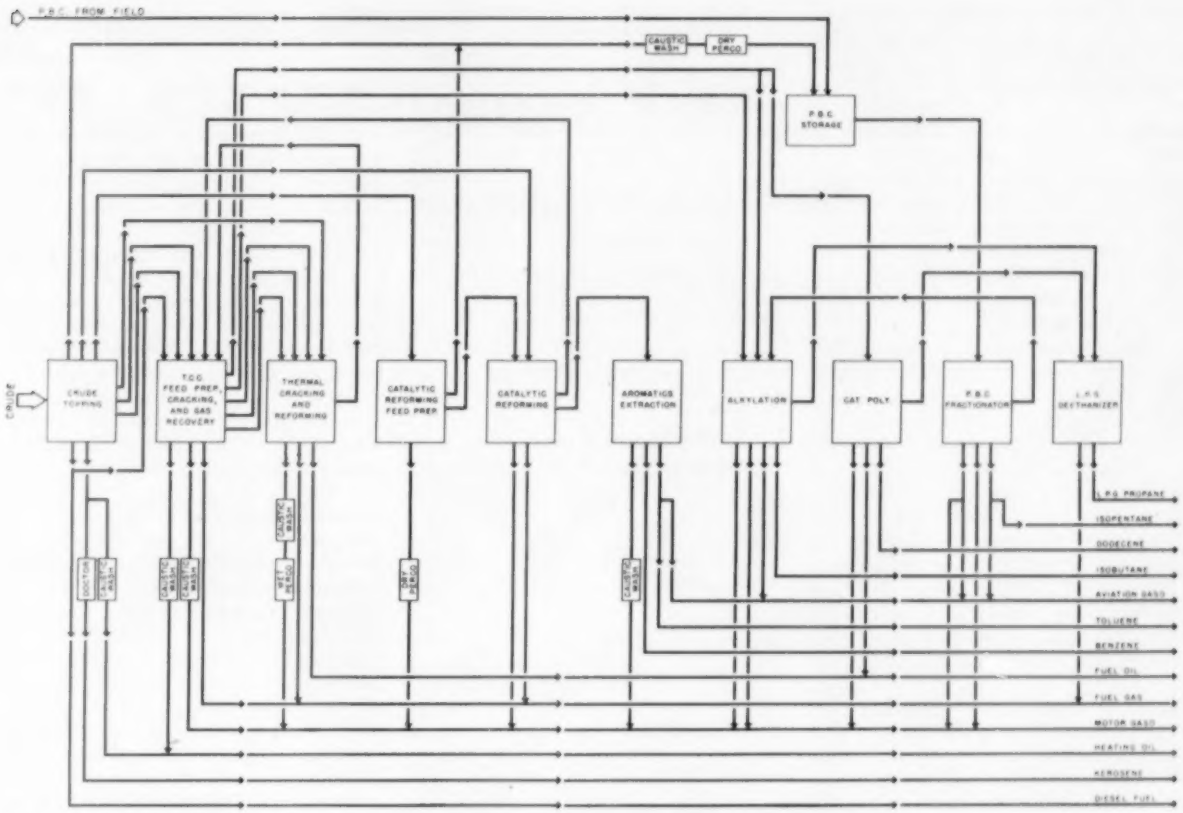
South Timbalier Block 52
(No. of platforms: 2)

1,428	A-3	Plugged and abandoned. Platform to be salvaged
1,428	B-1	Wildcat now drilling

South Timbalier Block 54
(No. of platforms: none)

(Wildcat to be drilled later this year)

HELICOPTERS are in regular use at the Grand Isle base, shunting men and equipment to and from the drilling-production platforms. A large 8-man craft and a smaller one are used by Humble here. Drilling crews ride the larger one and the smaller one is used for emergency service and "hot-shot" duty. The author, William P. Sterne, with The Oil and Gas Journal, appears in front of the "bubble."



Continental Oil Co.'s Lake Charles refining facilities include two new gas-lift T.C.C. units contained in a joint structure and which feed into a common fractionation system.

Continental Enlarges Lake Charles Plant

. . . Now rated at 45,000-bbl. per day capacity

THE test period for new facilities in Continental Oil Co.'s enlarged 45,000 bbl. daily refinery at Lake Charles, La., has recently been completed and the plant is now on full production.

Keeping in step with the tradition of the industry, most of the units of this refinery have operated well in excess of design capacities. A typical refinery-yield balance attained with the enlarged facilities is summarized in Table 1.

Crude topping . . . The plant now contains two atmospheric crude-topping units. The original unit was modified slightly to increase its capacity from 12,000 to 16,000 bbl. per day. The new crude unit, designed to process 30,000 bbl. per day, has been operated at a capacity of 38,000 bbl. per day. The light ends are run to storage with the field condensables (P.B.C.). The stabilized straightrun gasoline is fractionated in two 50-tray towers yielding a light fraction which is combined with the field condensables, a middle cut for catalytic reforming containing benzene, toluene, and C_6 and C_7 naphthenes, and a heavier straightrun fraction which is yielded directly to gasoline. A portion of the side-cut naphtha is thermally reformed and the remainder is reformed catalytically in a blocked-out operation.

Lubricating-oil stocks . . . A portion of the topped crude produced on the new crude unit is transferred by pipe line to Cit-Con Oil Corp.'s lubricating-oil plant, located about 7 miles from the Continental refinery. The remainder of the topped crude is yielded directly to one of the catalytic cracking unit feed-preparation sections. Two streams are returned from the Cit-Con plant to the Conoco refinery. One stream is a blend of gas oil, slop waxes, and extracts from the solvent extraction of distillate lube fractions. This stream is catalytically cracked at the refinery. The other stream, a residual extract from bright-stock operation, is returned separately for visbreaking.

P.B.C. fractionation . . . This is so called because it is a mixture of propane, butane, and casing head. It is a combination of field condensables and light ends from crude distillation and straightrun-gasoline superfractionation. This material is first charged to a deisobutanizer. Propane and isobutane are taken overhead to a depropanizer, and the bottoms are fed to a debutanizer, thence to a deisopentanizer to produce normal butane, isopentane, and denuded casing head. The bottoms from the depropanizer are fed to the alkylation unit, and the overhead becomes propane L.P.G. after deethaniza-

tion. A recycle condensate stream from the alkylation unit is fed into this same depropanizer in order to purge propane from the alkylation system.

Catalytic cracking . . . Two new gas-lift T.C.C. units are contained in a joint structure and feed into a common fractionation system. The two cat crackers have separate feed-preparation facilities. One feed-preparation system is designed to feed only distillate stocks, consisting of a charge drum, a vaporizer furnace, and a flash drum.

The feed-preparation system of the second cat cracker differs from that of the other unit in that a vacuum flash tower is employed. The feed to this cat cracker includes, together with light virgin gas oil, the excess topped crude over and above what is pumped directly to the Cit-Con lube plant. The vacuum flash tower bottoms are charged hot into the thermal unit for visbreaking. The gas oil-distillate extract-slop wax mixture from Cit-Con is charged to the first cat cracker to insure that the total stream will be fed into the reactor.

Thermal cracking and reforming . . . The thermal cracking unit includes four heating coils, a soaking drum, a combination evaporator and heavy gas-oil tower, a pressure bubble tower, vapor-phase clay-treating towers, an after-fractionator, an absorber, a stabilizer, and a fuel-oil flash system. The total fresh charge includes about 7,000 bbl. per stream day of residual stock and a catalytic cycle gas oil and about 2,300 bbl. per stream day of heavy straight-run naphtha. The refractory cycle gas oil is delivered to the adjacent oil carbon-black plant.

Catalytic reforming . . . The catalytic reforming unit (U.O.P. design) processes two types of stock on blocked-out operation. This is a four-reactor unit designed to operate at 500-psi. pressure when processing heavy naphtha for octane improvement and at 250-psi. pressure when processing superfractionated light naphtha for production of aromatics.

Alkylation . . . The sulfuric acid alkylation unit is of the autorefrigeration type, having a design capacity in excess of 2,500 bbl. per stream day of true alkylate. Primary equipment are two reactors which operate in series, caustic and water-wash facilities for the reactor effluent, an isobutane tower, a debutanizer, a rerun tower, and four compressors having a total capacity of 1,600 b.hp. A dependanizer is now being installed to operate between the debutanizer and rerun towers to permit the charging of more amylenes to the unit. The new equipment added as a part of the enlargement program includes a new three-stage cascade-type reactor, two new 500-hp. compressors, a new and larger rerun tower, additional heat exchangers and reboilers, and several new pumps. The fresh feed to the alkylation unit includes the butane-butylene fraction from the main vapor-recovery unit, an isopentane-amylene fraction, and at times a portion of the propane-propylene, together with a relatively high-purity isobutane fraction from the light-end fractionation system.

Normal butane is presently taken overhead from the debutanizer to storage for gasoline blending, L.P.G. sales, and seasonally for thermal polymerization. In the ultimate scheme the bottoms from the debutanizer will flow to the dependanizer, producing overhead a stream of isopentane suitable for avgas blending and a bottom stream of total alkylate with a vapor pressure of about 6.5 psi. The bottoms from the dependanizer will pass next to the rerun tower to produce an overhead fraction of aviation alkylate and a bottoms product of heavy alkylate which is used in motor-gasoline blending.

TABLE 1—OVER-ALL REFINERY BALANCE

	B.P.C.D.
Fuel gas (F.O.E.)*	(1,504)
Propane L.P.G.	2,227
Isobutane	654
Isopentane	1,063
Pentanes	414
Denuded C. H.	531
Light alkylate	2,232
Toluene-xylene	270
Total 115/145 avgas	3,447
Butanes	2,190
Denuded C. H.	1,103
Raffinate from aromatics extr.	1,966
Str. run	4,990
Heavy platformate	1,728
Thermal cracked and reformed	2,761
Cat cracked	7,491
Cat poly	174
Heavy alkylate	168
Total 10-lb. gasoline	22,571
Benzene	352
Toluene-xylene	826
Dodecene	378
Kerosine	2,355
Regular diesel	1,325
Kerosine	333
Regular	1,000
Total special diesel	1,333
Kerosine	3,212
Cycle heating oil	6,106
Total heating oil	9,318
Carbon-black distillate	430
Net lubes and waxes (Cit-Con)	2,723
Heavy fuel oil	4,345
Field condensables	3,772
Crude	50,000
Total charge	53,772

*Fuel-oil equivalent.

Catalytic polymerization . . . Primary equipment in the catalytic polymerization unit includes six tubular reactors, a depropanizer, a recycle tower, and a dodecene rerun tower. Light polymers, including dimers and trimers, are recycled to the first set of three reactors which operate in parallel. Half of the propane-propylene fresh feed enters the first set of three reactors in mixture with the recycle light polymers. The remainder of the propane-propylene fresh fed is mixed with the effluent from the first set of three reactors, and the combined stream passes through the second set of three reactors in parallel, thence to the depropanizer.

Aromatics extraction . . . Aromatics are separated from the nonaromatics in the light reformate stream by liquid extraction with sulfur dioxide at a temperature of about −24°F. The nonaromatics stream is yielded to motor gasoline; whereas the aromatics are fractionated to yield benzene which is shipped along with the dodecene to Continental's petrochemical plant at Baltimore. The bottoms product from the benzene distillation is a mixture of toluene and xylene of high purity which is used in blending aviation gasoline. *(The Oil and Gas Journal, May 31, 1954, page 87).*

Thermal polymerization . . . This is used intermittently for converting saturate propane and butane to motor gasoline when an excess of these materials develops.

Waste disposal . . . The spent caustic from the cat cracked gasoline scrubber is neutralized with hydrogen sulfide by contacting it with the absorber tail gas before the latter passes to the fuel system. Discard waters from the cooling system pass through a large basin for settling and skimming before they are discharged to the bayou. Oil-bearing waste waters pass through a separator to recover the oil before the waters are discarded to the bayou. All recovered oil is processed through the thermal cracking unit.

The prime contractor for the new process units, except the Platformer, and for the alky revamp was the Badger Process Division of Stone & Webster Corp. The Platformer was built by U.O.P.'s affiliate, Procon. Steam boilers were installed by Vogt. The two new power generators were installed by Westinghouse, the tanks by Chicago Bridge & Iron, and Bethlehem, and the two new docks by Coastal Construction Co.

What Is the Demand for Ethylene?

. . . estimates range to 3 billion pounds by 1956

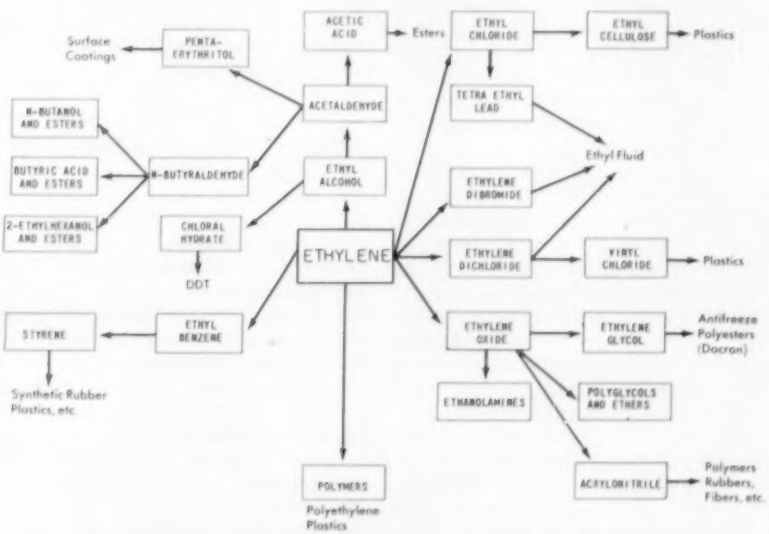
by H. A. Mitchell

- Great growth and diversification in ethylene derivatives has been a most significant development in postwar petrochemical expansion.
- This article, the first in a new Journal series on ethylene, gives some figures on ethylene uses and demand. It also deals with propylene and butylenes usage and effect on L.P.G. demand.
- The ethylene series will continue in a later issue of the Journal with notes on the Gulf Oil Corp. ethylene manufacturing operation at Port Arthur, Tex.

IT has been estimated that approximately 25 per cent of the total production of chemicals in the United States during 1953 falls within the category of petrochemicals. The most important group in this field both from point of view of volume of production and total value are the aliphatics, which constituted an estimated 70 per cent of the 1953 petrochemical production and are derived mainly from hydrocarbons in the range from methane through butane and the butylenes. This discussion is limited to those chemicals directly or indirectly derived from hydrocarbons falling within the L.P.G. range and the effect of the future growth in these chemicals upon the L.P.G. market and the outlook for further expansion in their production.

Author is with Shell Chemical Corp., New York. Paper presented at thirty-third annual N.G.A.A. meeting, Dallas.

Olefins and saturates . . . One of the first problems to be encountered in any endeavor to evaluate L.P.G. propane or butane requirements for petrochemical manufacture is the necessity of differentiating between the utilization of the olefinic hydrocarbons within this range, ethylene, propylene, and butylenes, and the requirements for the unsaturated hydrocarbons, ethane, propane, and normal butane. Regrettably, many of the statistical reports available on L.P.G. and L.R.G. usage do not make any differentiation between the olefins and the saturates, and those that do frequently suffer from the broad interpretation given to L.P.G. or L.R.G. by the reporting companies.



CHEMICAL DERIVATIVES OF ETHYLENE. FIG. 1

Ethylene

One of the most significant aspects of the postwar expansion of petrochemical production has been the growth in those chemicals derived from ethylene. The scope of chemicals directly or indirectly produced from ethylene can best be illustrated by Fig. 1.

The cracking of petroleum has long been a source of olefins for chemical manufacture. Ethylene recovery from refinery cracking operations was the first major source of this material. As requirements increased, the cracking of selected hydrocarbon fractions for ethylene production was undertaken, followed more recently by the pyrolysis of ethane and propane in order to meet the drastically increased requirements for this essential feed stock. This recent trend has been one of the main causes of the phenomenal increase in L.P.G. requirements for chemical manufacture as shown in such statistical reports as the Bureau of Mines.

Ethyl alcohol . . . Synthetic ethyl alcohol is the largest single consumer of ethylene in the aliphatic chemicals, utilizing an estimated 28 per cent of the 1953 ethylene production. The petrochemical industry produced approximately 148 million gallons of synthetic ethyl alcohol during 1953, or roughly 60 per cent of the total United States production of this material. An estimated 50 per cent of the United States requirements of acetaldehyde and a major share of the acetic acid, acetic anhydride, normal butyl alcohol, miscellaneous acetates, and many other chemical derivatives are the end products of this large volume of primary raw material.

Ethylene oxide glycol . . . Next in importance, both from ethylene usage and

the wide range of distribution of its derivatives, is the production of ethylene oxide and its immediate derivative, ethylene glycol. In our evaluation of ethylene oxide glycol production we are not concerned with the merits of the individual processes being utilized for its manufacture but rather must limit out attention to its position as the second largest consumer of ethylene, with an estimated 24 per cent of the 1953 ethylene production going to the manufacture of ethylene glycol alone. A list of the derivatives of ethylene oxide and its subderivatives is, to say the least, as impressive as ethyl alcohol, and in addition to such products as ethylene glycol antifreeze, and the ethanolamines, used in gas treating, ethylene oxide is utilized in the manufacture of a wide group of intermediates which ultimately complete their chemical processing in the production of products covering the field all the way from the new synthetic fiber, Dacron, to plastics, detergents, and many other uses.

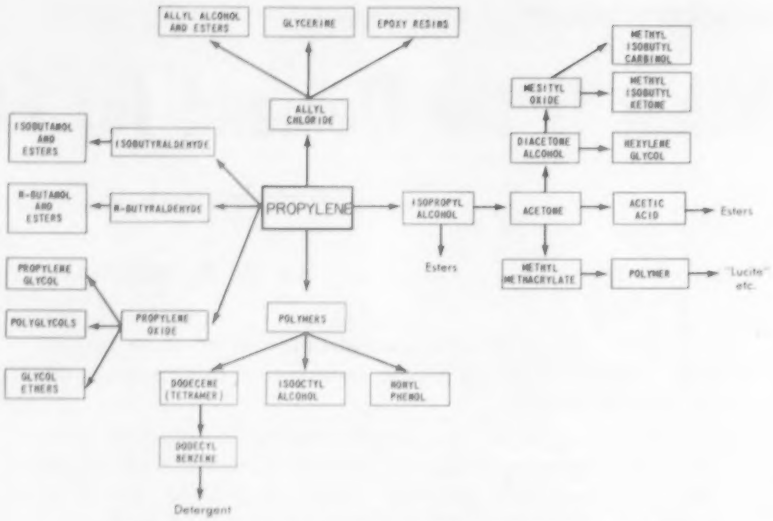
Ethylene diversification . . . Other major end uses of ethylene include the manufacture of styrene, which is used extensively as a polymer or plastic in addition to its use in the production of synthetic rubber; ethyl chloride, used in the manufacture of tetraethyl lead and the production of ethyl cellulose, a new plastic development; ethylene dichloride, used chiefly in the production of TEL fluid and as an intermediate for vinyl chloride manufacture; and ethylene dibromide, a constituent of TEL fluid.

One of the newest and perhaps potentially one of the largest ethylene consumers is polyethylene, a plastic of unusually versatile application already finding extensive use as an insulating material in electronic devices and in the packaging field where the flexible bottles are becoming increasingly popular.

Ethylene demand . . . As one reviews the fields in which ethylene derivatives are finding application, it is not surprising that the production and utilization of ethylene has grown by approximately 30 per cent during the past 4 years. Perhaps the best way to review past usage and at the same time provide a guide to estimating future requirements would be to show, as in Table 1, the estimated ethylene usage for a few of the major ethylene derivatives or intermediates for the years 1950 through 1953.

TABLE 1—ESTIMATED ETHYLENE DEMAND FOR MAJOR ETHYLENE INTERMEDIATES
(In million pounds of ethylene)

Year	1950	1951	1952	1953
INTERMEDIATE				
Synthetic ethyl alcohol	478	557	560	603
Ethylene glycol	380	450	595	475
Ethanolamines	28	32	37	35
Acrylonitrile	25	26	28	35
Styrene	167	219	217	248
Ethyl chloride	147	175	185	197
Ethylene dichloride	95	135	135	142
Ethylene dibromide	30	35	38	40
Polyethylene	55	80	100	135
Miscellaneous	115	141	180	190
Total	1,520	1,850	2,075	2,100



CHEMICAL DERIVATIVES OF PROPYLENE. FIG. 2.

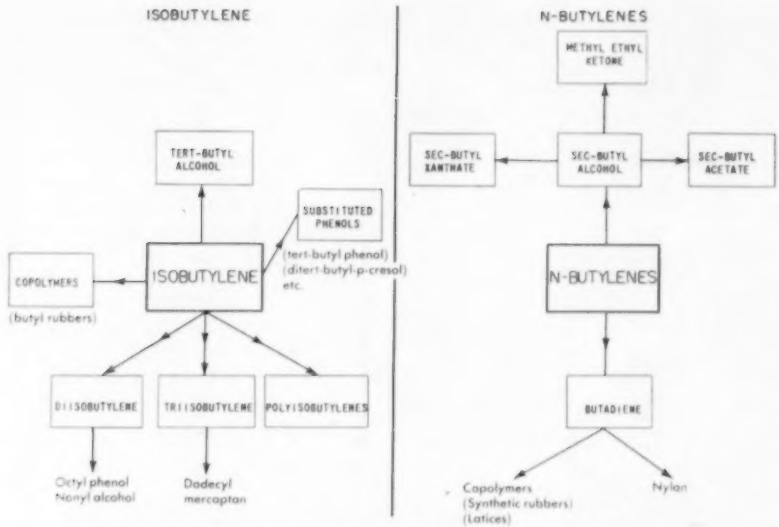
This table should be qualified by pointing out that it represents an estimate of the ethylene requirements for the production of that portion of these chemicals produced from ethylene and thus does not take into consideration production from other feed stocks. On the basis of the growth and distribution of ethylene usage during the period 1950-1953 and taking into consideration new plants completed since that time and the anticipated increased demand for these intermediates over the next 2 to 3 years, we have estimated a total ethylene demand of approximately 3 billion pounds by 1956.

To producers and perhaps users of L.P.G. it should be of interest if ethylene demand is converted into L.P.G. propane demand. In order to simplify this problem, let us look at the probable increased L.P.G. propane requirements to produce the indicated 1 billion pounds per year of additional ethylene. After taking into consideration the increased availability from increased petroleum cracking at refineries currently supplying petrochemical plants, the new production from plants operating on ethane, such as National Petrochemicals' plant at Tuscola, Ill., and Carbide's new plant at Seadrift, Tex., an estimate is made for ethylene demand from propane cracking in the order of 500 million pounds per year which will require an estimated 275 million gallons of L.P.G. propane.

Propane cost . . . Lest it be concluded that this increase in propane utilization will upset the present market position, it should be said that propane utilization as an ethylene feed stock will to a large extent be controlled by the delivered propane price. Any major increase in propane cost will divert ethylene operations to dry-gas sources utilizing the more readily recoverable ethane fractions from natural-gas processing facilities within economic pipeline distance of the petrochemical plants. The primary deterrent to a major expansion of ethylene operations in this direction is the limitation in availability at individual natural-gasoline plants and the necessity of pipeline transportation of the ethane fraction of ethane-bearing stream.

Propylene

The petrochemical operations based upon propylene, while no less diversified than those utilizing ethylene, do not have as direct a bearing upon the L.P.G. picture. By far the largest share of the propylene utilized in petrochemical production is recovered in the course of petroleum-cracking operations, and essentially all of the remaining requirements are obtained as a result of cracking operations directed primarily toward the production of other petrochemical feed stocks such as ethylene, butylene, or butadiene. For this reason it is not anticipated that the future growth in this segment of petrochemical operations will have a direct bearing on L.P.G. demand except



CHEMICAL DERIVATIVES OF BUTYLENES. FIG. 3.

insofar as the increased recovery of propylene will have an effect upon propane recovery and, hence, propane availability. A brief resume of the derivatives of propylene is presented in Fig. 2 in order to round out the over-all petrochemical picture.

Isopropyl alcohol . . . As in the case of the ethylene derivatives, the largest single utilization of propylene is in the production of the equivalent alcohol, isopropyl alcohol, which consumed an estimated 73 per cent of the 1953 petrochemical usage of propylene. Isopropyl alcohol finds utilization in many fields such as lacquer solvent, rubbing alcohol, antifreeze, and vitamin purification as well as being utilized in the manufacture of an estimated 90 per cent of the United States production of acetone. This latter usage alone accounted for an estimated 550 million pounds of isopropyl alcohol utilization in 1953. Acetone, in addition to its broad usage as an industrial solvent, is the starting point for the synthesis of a diversity of alcohols, ketones, and glycols.

Dodecene . . . The second largest consumption of propylene in chemical manufacture is in the production of dodecene (tetrapropylene), which is one of the basic raw materials in the manufacture of a large group of synthetic detergents.

Allyl chloride . . . One of the later developments in propylene utilization is in the manufacture of allyl chloride, which is the raw material for the production of synthetic glycerin as well as being a starting point for the production of a new group of resins based upon epichlorohydrin. The remaining propylene utilization in petrochemicals includes such materials as butyraldehyde and its derivatives by the Oxo process, cumene production from benzene and propylene, propylene oxide and glycol, and other derivatives. Based upon the estimated 1953 production of the propylene petrochemicals, propylene utilization in petrochemical manufacture in 1953 reached a probable level of 1,125 million pounds or 260 million gallons.

Butylenes

Next in order but by no means least in importance in the field of chemicals utilizing hydrocarbon fractions in the L.P.G. range are the butylene derivatives which are shown on Fig. 3.

Butadiene . . . This is the most important product in this group and is used primarily in the manufacture of G.R.-S., currently the largest production of synthetic rubber. The 1953 production of 1, 3-butadiene from petroleum sources at the government butadiene plants totaled approximately 477,000 short tons and consumed an estimated 3,150,000 bbl. of normal butane and 4,370,000 bbl. of normal butylene. Private industries' production of butadiene is primarly from non-L.P.G. feedstocks and thus does not have any direct bearing upon L.P.G. demand. The probable future requirements of butadiene, and, hence, normal butane and normal butylene, for the period 1955-1956 are a matter of real concern to those companies presently contemplating bidding on the purchase of those government facilities, and it is felt certain that the reader will understand the author's reluctance to undertake to estimate the requirements for this period.

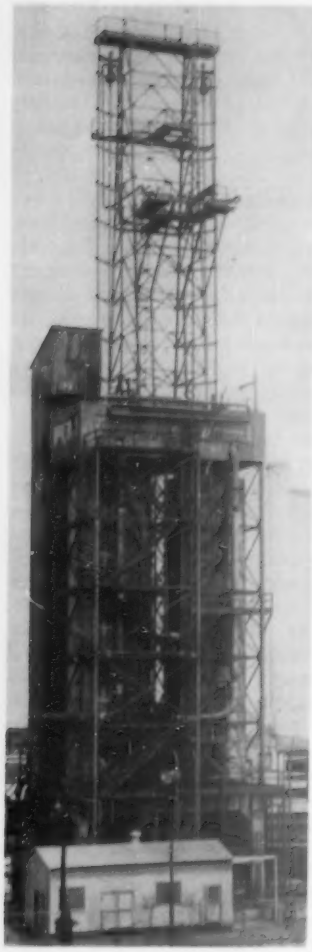
Isobutylene usage in the production of butyl rubber reached an estimated 840,000-bbl. level during 1953 and resulted in the production of 78,500 tons of G.R.-I.

Butyl alcohols, etc. . . . Aside from butadiene production, the largest usage of normal butylene in petrochemicals is in the manufacture of secondary butyl alcohol and its primary derivative, methyl-ethyl-ketone. Because of the limited number of companies engaged in the manufacture of these two products, detailed statistics on past production are not available from normal channels. Statistics are available, however, for the over-all production of butyl alcohols, exclusive of normal butyl alcohol, and the 1952 production of secondary butyl, tertiary butyl, and isobutyl alcohol was roughly 188 million pounds. Since the production of isobutyl and tertiary butyl alcohol included in this total is not large, we might conclude, therefore, that normal butylene usage for secondary butyl alcohol production was in the range of 800,000 bbl. (3,360,000 gal.) during 1952. As previously mentioned, the production of tertiary butyl alcohol and other derivatives, including the isobutylene polymers such as the polyisobutylenes used as viscosity-index improvers in the lubricating-oil field, is not extensive.

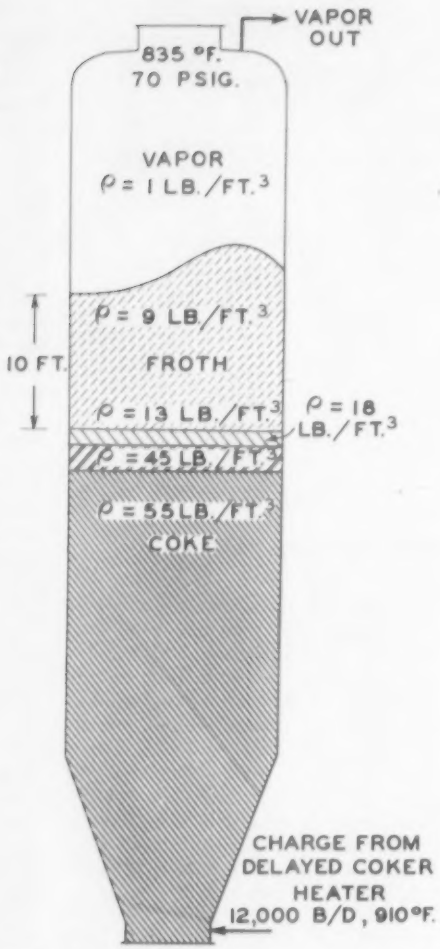
Direct Oxidation of L.P.G.

In addition to the L.P.G. usage for the production of olefins as summarized previously, there is a substantial usage of both propane and butane for petrochemical production by direct chemical methods. The best known and perhaps the largest additional factor in L.P.G. usage for chemical manufacture is the direct oxidation process, utilizing propane and/or butane for the production of such chemicals as acetone, methanol, formaldehyde, isopropyl alcohol, normal propyl alcohol, acetaldehyde, and acetic acid to name but a few of the direct or indirect products of these reactions. Although an increase in utilization of these processes will have a bearing upon the production of the same materials by the olefinic route, the net effect upon L.P.G. requirements will be within the limits of our estimate of increased L.P.G. requirements over the period involved.

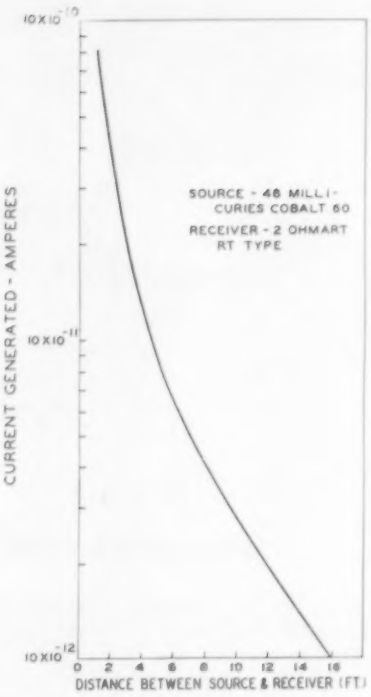
A small offtake of propane has developed for use in direct chlorination operations for the production of carbon tetrachloride and other chlorinated petrochemicals, but at the present time this process has had only limited application.



DELAYED COKING UNIT at Socony-Vacuum's East St. Louis refinery.



PHASE RELATIONSHIPS during coke formation in the drum of delayed coking unit. Fig. 1.


10X10⁻¹⁰
10X10⁻¹¹
10X10⁻¹²
CURRENT GENERATED - AMPERES
SOURCE - 48 MILLI-CURIES COBALT 60
RECEIVER - 2 OHMART RT TYPE
0 2 4 6 8 10 12 14 16
DISTANCE BETWEEN SOURCE & RECEIVER (FT.)

GENERATED CURRENT as function of distance between source and receiver. Fig. 2.

Knowledge gained by the study here reported, regarding phase relations in a coke drum, has substantially aided in explaining operational deficiencies and in planning optimum unit operating conditions.

What goes on

INSIDE A COKE DRUM

by C. E. Werstler, R. J. Niederstadt and H. A. Lutz

COKE-LEVEL and phase relations in a delayed coking drum have been determined using gamma-ray-emitting Cobalt 60. Maximum coke production can be more nearly approached by using this instrumentation, as final drum quantities can be anticipated knowing rate of coke formation as the drum fills; also froth levels can be maintained below the drum outlet.

The delayed coking unit in the East St. Louis refinery of Socony-Vacuum Oil Co., Inc., was designed and built in 1950 to process crude bottoms from Houdry fixed-bed and T.C.C. catalytic cracking units; subsequent processing has provided additional charge for the unit. Carbon contents vary with catalytic unit operating conditions. Field storage of these heavy oils and other refinery streams for charging stock causes coke formation from a given quantity of feed to vary considerably from day to day.

In a 3-month period the drum quantities varied from the desired as much as 20 per cent on a single drum; the average deviated 9 per cent. A study of the coke produced by days after 2 years of operation showed very clearly that maximum coke level was desirable to increase the unit's ability to dispose of crude bottoms. A differential pressure installation was attempted and proved unsatisfactory as did laboratory determinations of the carbon residue on the feed stock; a gamma-ray device manufactured by Ohmart Corp., Cincinnati, was purchased.

Gamma rays used . . . The instrument operation is described. Radioactive Cobalt 60 emits gamma rays which are received in a cell containing an inert gas. The ionization of the gas by the rays produces a current which varies with the radiation received by the cell;

Authors are associated with Socony-Vacuum Oil Co., East St. Louis, Ill.

oil vapors and coke decrease the transmission.

An exterior installation was made on a 6-ft. chord of the 70-ft.-high, 16-ft. diameter and 1 15/64-in. wall thickness drum at a level 35 ft. from the top. The 24-millicurie source under these conditions was not sufficient.

The second installation was made with a source of 48 millicuries on a diameter of the drum. This procedure gave readings showing a product in the drum which reduced the radiation to the receiver 4 to 8 hours before coke should have reached this level. A third installation was made on an 8-ft. chord.

This experience plus testing with various thicknesses of coke and steel in a mock setup and subsequent calculations (see Figs. 2 and 6) caused the present installation to be constructed. The 48-millicurie source was placed in an 18-in. thermocouple well placed perpendicular to the tangent of the drum. The receiver was placed at the periphery of the drum so that a distance of 42 in. separated the source and the receiver.

Vapor densities . . . The equipment shows a vapor with a density of 9 lb. per cu. ft. exists some 8 to 12 ft. above the coke bed. As the coke level continues to increase with the instrumentation at a fixed level the density of the "froth" between the source and the receiver increases to a range between 13 and 18 lb. per cu. ft. The equipment, as the coke passes the determination level within a 30-minute period, shows the density increasing to 45 lb. per cu. ft. (see Fig. 1).

The height of the froth (density of 9 lb. per cu. ft. at operating temperatures) above the coke level is a check on the coking temperatures. Experience with our charging stock shows satisfactory drum operation and no liquid carryover from the drum with a froth 10 ft. above the coke level. Lower tem-

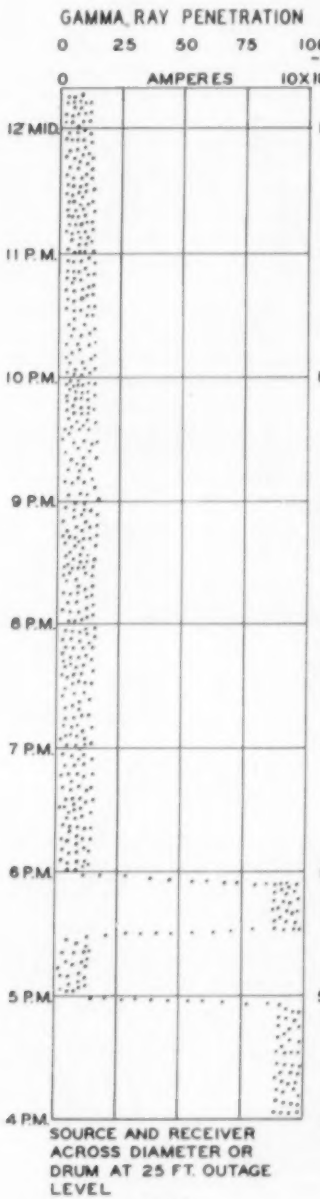


Fig. 3.

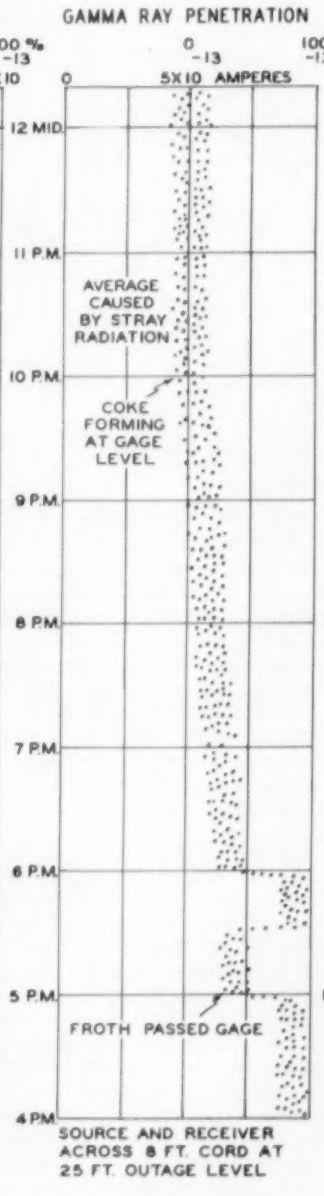


Fig. 4.

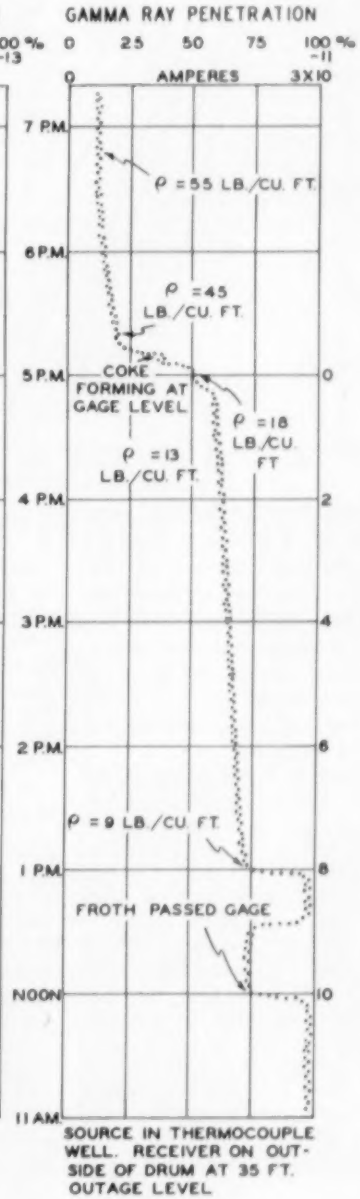
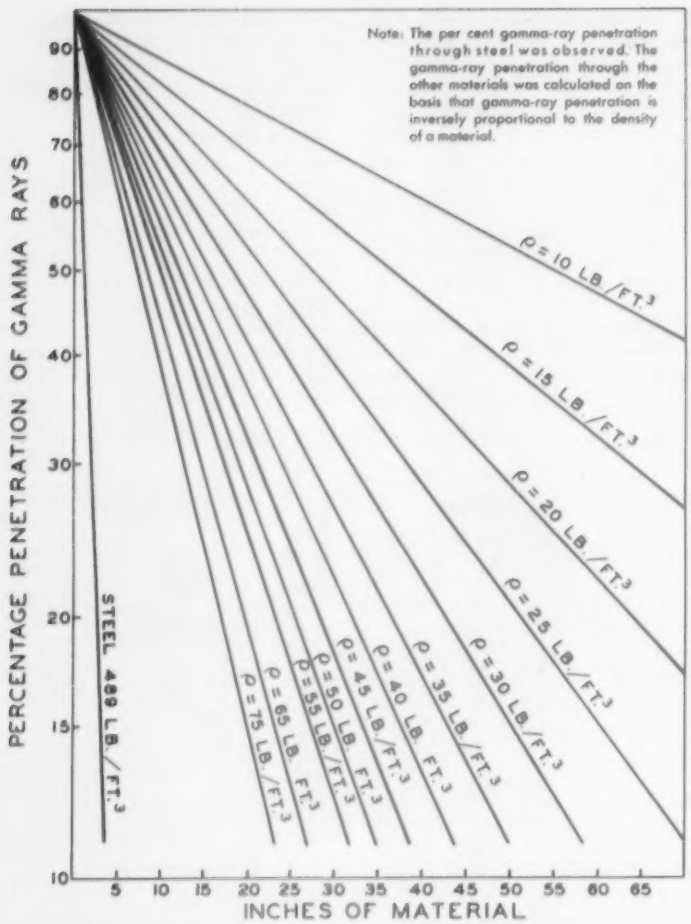


Fig. 5.

Reproductions of typical strip chart recordings of Ohmart level gage.


Note: The per cent gamma-ray penetration through steel was observed. The gamma-ray penetration through the other materials was calculated on the basis that gamma-ray penetration is inversely proportional to the density of a material.
PERCENTAGE PENETRATION OF GAMMA RAYS
INCHES OF MATERIAL
STEEL 489 LB./FT.³
ρ = 75 LB./FT.³
ρ = 65 LB. FT.³
ρ = 55 LB./FT.³
ρ = 50 LB. FT.³
ρ = 45 LB./FT.³
ρ = 40 LB. FT.³
ρ = 35 LB./FT.³
ρ = 30 LB./FT.³
ρ = 25 LB./FT.³
ρ = 20 LB./FT.³
ρ = 15 LB./FT.³
ρ = 10 LB./FT.³

EFFECT OF DENSITY of medium on gamma-ray penetration. **Fig. 6.**

peratures with higher froth levels can contribute to carryover of heavy oils to the drum outlet vapor lines. At higher coke levels, prior to drum switching, temperature control becomes more critical because liquid carryover causes excessive line and valve cleaning and shorter on stream periods.

It is planned to install similar equipment at two levels on each drum. The lower installations at a point approximately midway on the drum will provide the operating personnel with the anticipated final drum level at drum switching time assuming no change in operating variables. The upper installation at a point 5 ft. below the desired drum level will indicate at the time coke passes this point that drum switching must be accomplished 2½ hours later; coke production is approximately 2 ft. per hour. This indication should allow sufficient time to prevent overfilling of a drum and at the same time aid in achieving the desired levels each day.

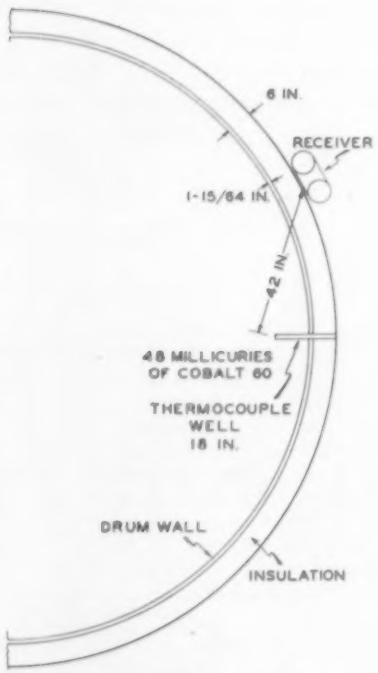
Fig. 3 shows a strip recording obtained when a source of 48 millicuries and the receiver were placed across the diameter of the drum. The current decreased to zero at 5 p.m. and then increased to a maximum current before again dropping to zero; this observation indicated the froth was pulsating or was climbing up one side of the drum and then the other. Since the current was reduced to zero by the froth it was impossible to tell when the coke passed the gage with this installation.

Coke depth . . . Fig. 4 is a reproduction of the strip recording obtained when a source of 48 millicuries and the receiver were placed across an 8-ft. chord of the drum. With this installation, sufficient radiation passed through the empty drum to generate a current of 5×10^{-13} amp. An additional 5×10^{-13} amp. was generated by gamma rays which, in some manner other than the direct path, reached the receiver. The froth did not completely absorb the gamma rays passing through the drum.

It was possible, therefore, to tell when the coke passed the instrument. There was a slight drop in amperage at 10 p.m. when the gamma-ray penetration was reduced to zero by the coke; this observation was not easily made because outside interference caused the recorder to swing through a span of 1.5×10^{-13} amp. while the current decreased only 5×10^{-14} amp. at the time coke passed the gage.

Fig. 5 is a reproduction of the strip chart obtained when the 48-millicurie source was placed in a thermocouple well inside the drum at the 35-ft. outage level with receiver on the periphery of the drum (see Fig. 7). The gamma rays penetrate 30 in. of material inside the drum. Since the source and receiver are much closer together an initial amperage of 3×10^{-11} was obtained with an empty drum. Outside interference had very little effect in this higher amperage range. It can be seen that when the froth first passed the gage the gamma ray penetration was cut to 70 per cent; this indicated the froth had an approximate density of 9 lb. per cu. ft. (see Fig. 6). The density increased steadily until it reached 18 lb. per cu. ft. at the coke-froth interface. The density then rapidly increased to 45 lb. per cu. ft. Within an hour or two the density gradually increased to 55 lb. per cu. ft. and remained constant until the drum was taken off stream.

The cooperation, observations, and comments of other refinery personnel are acknowledged and very much appreciated.



OHMART INSTALLATION at 35-ft. outage level. **Fig. 7.**

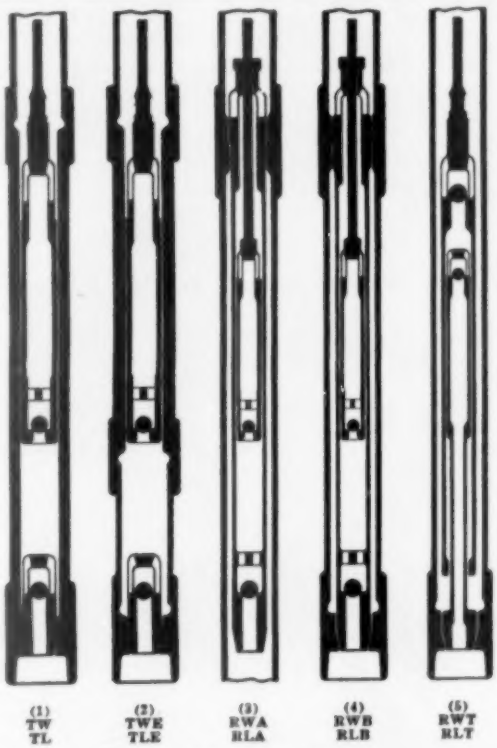


Fig. 1—A.P.I. pump classification.

TABLE I

	Abbreviations—Full barrel	Abbreviations—Liner barrel
(1) Tubing type, with shoe	TW	TL
(2) Tubing type, with extension shoe and nipple	TWE	TLE
(3) Rod type, stationary barrel, with top holddown	RWA	RLA
(4) Rod type, stationary barrel, with bottom holddown	RWB	RLB
(5) Rod type, traveling barrel	RWT	RLT

First letter: T = tubing type; noninserted, run on tubing. R = rod or "inserted" type; run on the rods, through tubing.

Second letter: W = full barrel; supersedes "cold-drawn working barrel," also "cast iron" type. L = liner barrel; includes sectional and full liners.

Third letter: E = tubing pump with extension nipple and shoe. A = stationary barrel rod pump with top holddown. B = stationary barrel rod pump with bottom holddown. T = traveling barrel rod pump.

Use these yardsticks in selecting

Rod Pumps That Give Best Service

. . . reduce that 85 per cent labor cost of a pumping lease

by O. H. Leichliter

IN order to properly select the pump for a specific well, the operator must know the amount of oil that the well will produce as well as the specific problems found in the well.

In new installations, where these factors are not known, they can be found by obtaining the productivity index of the well and by closely observing the fluid produced from the well as well as the equipment which has been operating in the fluid in the well. There is no one design of pump or type of metal that is a cure-all for all oil-well problems.

Many pump designs and combinations of metals have been developed to meet the various problems (or conditions) found in an oil well. We will, therefore, first classify the problems found in the well, and then present suggestions as to the proper design and combination of metals to be used in the pump to meet the specific conditions of the well.

Author is with Sargent Engineering Corp., Tulsa. Paper presented at the Texas Tech oil-lift-methods Short course, Lubbock, April 22, 1954.

Normal Conditions

By wells under normal conditions we mean those which do not present severe or abnormal conditions—wells in which the oil is clean, noncorrosive, of medium gravity or viscosity, and of shallow to moderate depth.

Metals . . . Under normal conditions any metal can be used. Soft cast-iron liners and a steel plunger can be used. However, in many areas the most widely used, under normal conditions, are hard cast iron for liners, and steel which is chrome plated, for plungers. (The difference in price is very little.) However, the longer-wearing hard cast-iron and chrome plungers (in comparison to soft cast-iron and steel plungers) pay for themselves many times over by greatly reducing the number of pulling jobs.

Many operators wish to standardize on one or two types of pumps. The soft cast-iron and steel plungers have very limited application. The hard cast-iron and chrome plungers can be used, not only in wells with normal conditions, but can also be used in some problem wells.

Design . . . Under normal conditions we have no design problem. There-

fore, any design can be used. The most popular design is the bottom-lock traveling plunger-type pump. The rod-insert pump is always used where the required volume can be obtained. The T.L.E. pump (see Fig. 1) is used only where the rod insert cannot produce the volume desired.

Sand, Abrasion, and Gyp

Wells which present sand problems are usually divided into two general classifications:

1. Wells in which the formation will suddenly heave large amounts of sand into the well, thus plugging up the valves and plunger of the pump.

2. Wells in which the fluid carries constant amounts of sand and can be pumped, but in which that sand wears the moving parts by abrasion rapidly.

In either case, when pump action stops, the sand in the tubing will settle back in the annulus between the pump and the tubing, seizing the pump so that it cannot be pulled. The well must then be pulled "wet" (in other words, a stripping job) which will greatly increase the cost of operation.

Under the first classification, that of heaving wells, where economy will permit, the best answer is to repair the well's casing or liner, if they are damaged. Under any sand condition, it is important that when the sand and fluid have once entered the tubing and pump, sufficient fluid velocities be maintained to carry the sand up the tubing and out of the well.

Metals . . . In abrasive wells (sand wells), parts exposed to abrasion (especially the piston, cylinder, and valves) should be made of the hard alloy steels. In most cases, the best answer to the metal problem in the abrasive well is stainless steel hardened to approximately 60° Rockwell C scale.

In severe cases a ring of tungsten carbide has been fitted on the end of the plunger and ground to plunger size. This will prevent the sand's cutting the lead edges of the plunger when it is fitted to liners with a close clearance (usually .0005). Whenever a plunger is fitted tight it must be made fairly short or it will seize on the "high spots" in the barrel (parallelism).

Pump design . . . Design is a most important factor when dealing with sand. In sand problems wells, **where the viscosity of the oil is not a problem,** the pump should be built so that:

1. The plunger has a close fit to the liners (usually .0005). This keeps the sand from getting between the plunger and the liners where it will cause excessive wear and, in many instances, cause the plunger to gall and seize.

"In sand problem wells in which the heavy viscous oil interferes with plunger travel (in wells where the oil is less than 16° A.P.I.) experience has shown that plunger travel is the major problem in pump design."

2. The plunger should have a square shoulder (pin end). It is A.P.I. practice to taper box end chrome plungers on the ends in order to allow for the swelling of the plunger when a fitting (pull rod, adapter, or pull tube) is screwed into it.

3. The plunger should stroke out both ends of the liners or cylinder into collars. Where sand or gyp exist in the well they have a tendency to accumulate on the liners just above the normal travel of the plunger. This accumulation will grow in size inside of the liner until it is sufficiently built up to seize the plunger when the plunger overstrokes.

By stroking the end of the plunger out of the liners into the nipple on each stroke, sand and gyp are prevented from accumulating in the liners.

In sand problem wells, in which the heavy viscous oil does interfere with plunger travel, (in wells where the oil is less than 16° A.P.I.) experience has shown that plunger travel is the major problem in pump design. The heavy viscous oil will usually carry the sand in suspension and, in most cases, where the pump is built with a loose fit plunger (.008 in several instances) the sand particles will slip past the plunger rather than sticking or galling it.

The pump design for sand in the heavy viscous oil is the same as with light oil, except the plunger is fitted very loose. This looseness will depend upon depth and viscosity of the well.

In sand wells the sand will often settle back into the annulus between the pump jacket and the tubing, seizing the pump so that it cannot be unseated or pulled. It is then necessary to pull the rods and tubing wet, causing a stripping job. There are three answers in design of the rod type pump to this problem.

Top-Lock Pump

Advantages . . . In a top-lock pump, the pump is seated in the tubing at the top of the pump, which seals off the annulus between the pump and the tubing. Therefore, sand cannot get into this annulus to seize or stick the pump. The amount of sand which can settle on the seating ring is limited because the fluid discharge from the pump keeps it washed free.

Disadvantages . . . (1) The top lock pump is limited as to depth because of the pressure differential between the inside and outside of the barrel. This pressure differential may expand or even break the barrel thus allowing the liners to come out of alignment. The weight of the column of fluid, when excessive or when the pump is pounding for fluid, may strip the collar threads on the jackets. (2) When a well is pumping intermittently, or while it is shut down for repairs, sand can settle back on the top of the plunger and traveling valve. In all traveling-plunger pumps special equipment can be obtained which, in some cases, will minimize this objection.

Traveling Barrel

Advantages . . . (1) In a traveling-barrel pump (sometimes called an upside-down-pump) the pull tube and plunger are anchored to the tubing, and the barrel or jacket reciprocates or moves up and down with the rods. By moving the barrel up and down, the fluid in the annulus between the pump and the tubing is agitated or kept in motion, which has a tendency to keep the sand in motion and washed out of the annulus between the tubing and pump. (2) Where the well is pumped intermittently, or the well is shut down for repairs, the sand is prevented from reentering the pump by the top or traveling valve, which is in the top cage. As soon as the pumping motion stops, the ball in the top cage seats itself, thus sealing the inside of the pump off from the fluid, sand, etc., from above. (3) In the traveling-barrel pump, the pressure is equalized between the inside and outside of the pump. (4) In the traveling-barrel pump, both the traveling and standing valve cages are of the open type.

Disadvantages . . . (1) There are wells where the sand may gradually settle in the annulus between the pump and the tubing. When enough sand has accumulated, it will prevent the full travel of the barrel on the down-stroke. (2) In deep wells the pull tube has a tendency to buckle because of the static pressure. (3) In the traveling-barrel pump, the standing valve is the small valve and the traveling valve is the large valve. This is a big disadvantage when the well has large volume or heavy viscous oil. It is also a big disadvantage when the well has very much gas to pump. The entrance or trapping valve should be the largest valve in the pump. The pressure drop across a small valve is greater than the pressure drop across a

"Advantages . . . (1) Sand cannot enter the annulus between the pump and the tubing. (2) Pressure is equalized between the inside and outside of the barrel. . . . (3) Standing valve is large with minimum pressure drop across its face."

larger valve. This greater pressure drop will increase the chances of gas coming out of solution in the pump, thus gas-locking the pump. (4) In crooked or slanted holes the traveling-barrel-type pump is not as good as the plunger traveling-type pump, as the barrel does not have unrestricted travel. (5) The high position of the standing valve in the traveling-barrel pump is a disadvantage in the wells with a low fluid level.

The Bottom-Lock and Top-Support (Seal) Pump

This pump is a combination of both bottom-lock and top-lock. It is anchored on the bottom and sealed off at the top, and has most of the advantages of both the top and bottom-lock pumps, without their disadvantages.

Advantages . . . (1) Sand cannot enter the annulus between the pump and the tubing. (2) Pressure is equalized between the inside and outside of the barrel, therefore, depth is not a pump problem. (3) The standing valve is the large valve, therefore, there is a minimum of pressure drop across its face. (4) In crooked holes, it is the best type reciprocal pump because it is of the plunger travel type.

Disadvantages . . . (1) The initial cost is slightly higher. (2) As with all traveling plunger pumps, in wells which are pumped intermittently or shut down for repair, the sand can settle on top of the traveling valve unless equipped with sand valve or preventer.

Production Suggestions for Sandy Wells

The following techniques have proved successful in sandy wells:

Back pressure on formation . . . (1) Tube the well high. Experiment lowering tubing gradually until the optimum position has been found. (2) Use the proper diameter of the plunger in the pump. Use the smallest plunger possible to obtain the desired production. (3) Apply back pressure on the fluid column. Carry casing pressure on well, using pressure regulator. This will help prevent heaving by the well. (4) Depress the fluid level slowly over a period of several days after the pump has been started.

Long, slow stroke . . . Many oil men believe that the opening and closing of the standing valve causes pulsations on the formation which tend to dislodge sand particles. By slowing this pulsation down, considerable sand is eliminated.

Fluid velocities . . . When sand has once entered the pump and tubing, sufficient fluid velocities should be maintained to carry the sand to the surface and out of the well. In severe cases, hollow rods (commonly known as macaroni) are successfully used to maintain the desired fluid velocity.

Gas anchor . . . If possible, a gas anchor should not be used in a sandy well. However, if a gas anchor must be used, it should be designed so that sand cannot accumulate in the bottom of the gas anchor. Also, it should be made so that the fluid velocity in the gas anchor is less than the fluid velocity in the tubing. When the fluid velocity of the gas anchor is greater than the fluid velocity of the tubing, sand will go through the gas anchor and pump but will settle in the tubing above the pump because of the lesser fluid velocity.

Sand trap . . . Where the well has floating or powder-type sand which settles in spite of top-lock, traveling-barrel, etc., the time between pulling and bailing jobs can often be lengthened by the use of a sand trip.

Pumps for Gaseous Areas

One of the most important factors in obtaining pump efficiency is the prevention of gas from entering the pump. The complete elimination is in most cases impossible. However, by proper selection, installation, and operation of equipment, this problem can be minimized.

When selecting a pump to handle gas, design is the most important factor. When free gas enters the pump, it will either partially or totally "gas-lock" the pump. A pump becomes gas-locked when free gas gets into the unswept area betwen the valves where it will expand and contract with each stroke, thus interfering with valve operation.

Pump design . . . (1) In order to prevent gas-locking, the pump must be built and operated so that there is a minimum of unswept area, and so that the traveling valve—on the downstroke—will have a minimum clearance with the standing valve. (2) Use the largest standing valve possible so that there will be a minimum pressure drop across the face of the valve. (3) Any metal can be used for gas if the gas is not corrosive.

Producing Gaseous Wells

Proper placing of pump in well . . . There are wells in many areas in which the gas is at the top of the zone. Considerable gas is eliminated from the pump by placing the pump below the gas section of the zone.

Restriction . . . Maintain sufficient clearance in the annulus between the tubing and casing for free passage of gas. If a tubing catcher is used, be sure that it has sufficient passage areas. If possible, stay out of the liner. Tubing collars often set up a turbulence because of the restricted area inside of the liner.

Gas anchor . . . Use an efficient gas-oil separator. Several good articles have ben written about gas anchors and their designs.

Long stroke . . . It is important that the pump have a high compression ratio. The longest stroke possible, combined with proper spacing, obtains the highest compression ratio possible in the pump.

Casing pressure . . . Maintain a minimum casing pressure.

Corrosion

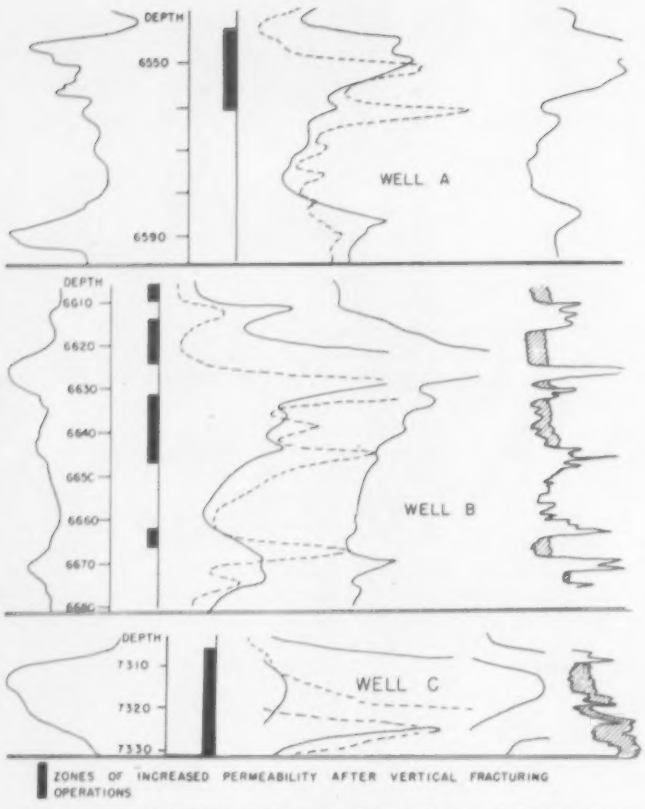
In the corrosion problem, from the point of view of choosing a pump, we have had considerable success by treating corrosion under three general classifications.

Hydrogen sulfide . . . The recommended metals to use with hydrogen sulfide are nickel alloys (nickel stainless steel) and hard cast iron. Do not use chrome alloy metals with hydrogen sulfide.

Brine corrosion . . . By brine corrosion we mean corrosion from all causes other than hydrogen sulfide. The recommended metals for these conditions are chrome alloy (chrome stainless steel).

Inhibited corrosion . . . By inhibited corrosion is meant corrosive wells in which inhibitors or chemicals have been added to the fluid to control corrosion. The metal recommended will depend entirely upon the success of the inhibitor. Where the inhibitor has been successful, a pump made with liners and a plunger of hard cast iron is in most cases successful.

THIS WYOMING SAND, interbedded with shales, is the type used for vertical fracture tests. Fig. 1.



SUBSTANTIAL INCREASES in permeability are indicated for long sections of the well bore in field trials of vertical fracture technique. Fig. 2.

Increasing oil and gas production by

Vertical Hydraulic Fracturing

. . . new method may also aid in secondary operations

by Roscoe C. Clark, Jr.,* and Jack J. Reynolds†

WHEN using nonviscous fluids in hydraulic fracturing to break down formations, the fracture will usually occur along a bedding plane creating, under normal conditions, a horizontal fracture.

Horizontal fractures are limited in their ability to increase oil and gas production, are ineffective in formations having normal horizontal permeability and little or no vertical permeability, and are not considered good practice where water flooding or other secondary-recovery operations are anticipated.

*The Western Co., Midland, Tex. †Continental Oil Co., Ponca City, Okla. Paper presented at 1954 Mid-Continent district meeting, A.P.I., Oklahoma City.

A method has been developed by the Continental Oil Co. laboratory for producing vertical fractures during hydraulic-fracturing operations. These vertical fractures can be extended to include a complete open-hole section, thus increasing the effectiveness of fracture extensions. Field tests have established the effectiveness of vertical fracturing over horizontal fracturing in formations having low vertical permeability in relation to horizontal permeability.

There is every indication that vertical fracturing will be an effective aid to secondary as well as to primary recovery operations.

While hydraulic fracturing has proved itself a most effective method for stimulating oil and gas-well production, efforts are being made by Continental Oil to improve its effectiveness both in making it practicable in wells in which this type of treatment is not now feasible and in increasing the general effectiveness of conventional treatments.

The presence of shale with or in a producing formation usually results in a fracture forming along the shale-sand interface.[1] Although this does not always result in an unsuccessful fracturing job, most wells completed in formations of this type will respond with a good flush production followed by a rapid decline back to the original production.

This is usually the type of results

CHEMICAL PROCESS NEWS

PUBLISHED BY CHEMICAL PROCESS DIVISION, THE M. W. KELLOGG COMPANY — AUGUST 1954

NOTES ON SYNTHOL

Synthol is the name of the Kellogg-developed process for catalytically reacting synthesis gas (carbon monoxide and hydrogen) to produce a wide variety of hydrocarbon materials and chemicals. Synthesis gas for the process can be derived from either natural gas or coal.

* * *

The first plant to utilize Synthol on a commercial scale is now under construction by Kellogg in South Africa. Partial combustion of coal (from vast deposits near the plant site) will form the source of the synthesis gas; primary products of the plant will be "petroleum" fuels—around 60 million gallons per year, of which the major part will be motor gasoline.

* * *

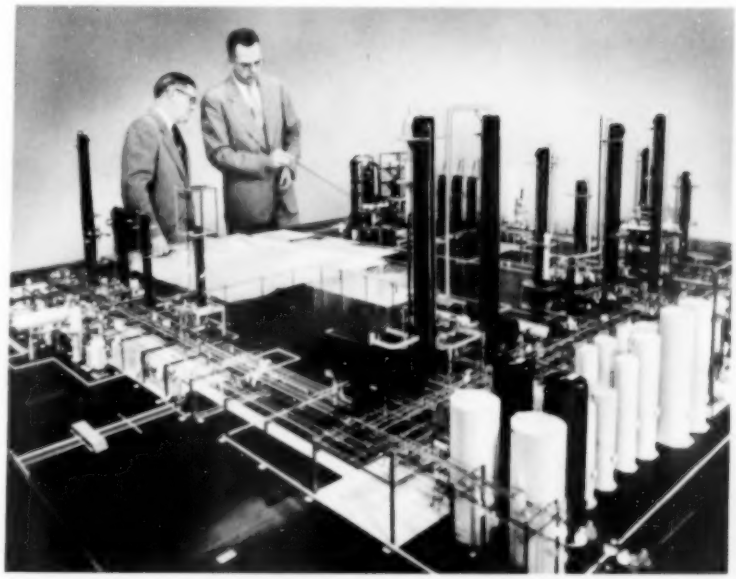
In addition to gasoline and fuel oil, the plant's output will include an impressive quantity of industrial and agricultural chemicals—about 125 million pounds. Many of these are oxygenated compounds, produced as by-products in the Synthol unit. While their volume is small in comparison with the enormous amounts of fuels produced, the higher market value of these chemicals adds substantially to the over-all attractiveness of the Synthol process.

* * *

The water-soluble or chemical stream from the Synthol unit is passed through a series of operations involving both extractive and conventional distillation to separate methanol, anhydrous ethanol, methyl ethyl ketone, and acetone. The methanol will be used as a solvent in the process and the ethanol will be blended into the gasoline pool. The other two chemicals will be marketed.

* * *

Additional equipment is being installed to produce commercial grade propanol and/or butanol, or to further process these products as additional gasoline.



Low Production Costs, High Yields and Flexible Operation Characterize New Phenol-from-Cumene Process

Shown above is a detailed model of a unique chemical plant Kellogg is currently building for Hercules Powder Company at Gibbstown, N. J. The plant will produce phenol, acetone, and methyl styrene, using the Hercules-Distillers process for oxidizing and splitting cumene. Kellogg, which developed the mechanical design of the commercial process in collaboration with Hercules, is also the originator of the process to be used for making the cumene feed.

The over-all process offers an unusual example of how refinery products can be upgraded to industrial chemicals to obtain a radical increase in value. Propylene, for example, which makes up one-third the volume of the initial feedstock, is readily available at low-cost. It can be combined with benzene by alkylation to form cumene, which is then oxidized to cumene hydroperoxide. The latter is subsequently split in a cleavage reaction to form the final products.

Of these, the phenol portion of the output is derived from the benzene part of the initial input. In the same way, the acetone produced is attributable to the low-cost propylene third of the feed.

As compared with other processes, the latter product—acetone—at present prices provides a bonus for the phenol produced as a major product. Moreover, the comparatively small quantity of methyl styrene produced can be separated and sold for use in the plastics industry, or it can be easily converted back to cumene and re-used in the process.

Recently completed phenol-from-cumene plant in Canada.

(continued on following page)

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Kellogg to Build Second Ethylene Plant for British Producer

Engineering is now virtually complete and construction is scheduled to begin shortly on the second ethylene plant to be designed and built by Kellogg for an important producer of chemicals in the British Isles. With a similar plant which is now under construction in Italy, the new one brings to a total of three the number of plants utilizing Kellogg's unique process for the steam-cracking of petroleum fractions to make olefins.

As embodied in these plants, Kellogg's process is characterized by high yields of high purity ethylene, and by high conversion of the feed without coking of furnace tubes. The prototype plant has now been in operation in England for more than two years and at no time has a shutdown been caused by furnace coking.

In essence, the process consists of a special high-temperature pyrolysis section in which naphtha or gas oil vapors are broken down, in the presence of steam, into ethylene and other gaseous fractions. These are then separated in a special low temperature fractionation system developed by Kellogg which allows production of ethylene of the extremely high purity needed for polyethylene manufacture. The process has demonstrated a high flexibility in both the handling of various feedstocks and in the ratios of desired products (olefins and aromatics) in the output.

The new plant, while not a duplicate of its predecessor, will preserve the general over-all features of the first plant but will include some additional process improvements. It will be slightly larger, and, like the first plant, will crack heavy naphtha for the primary production of ethylene to be used for manufacturing polyethylene.

(continued from previous page)

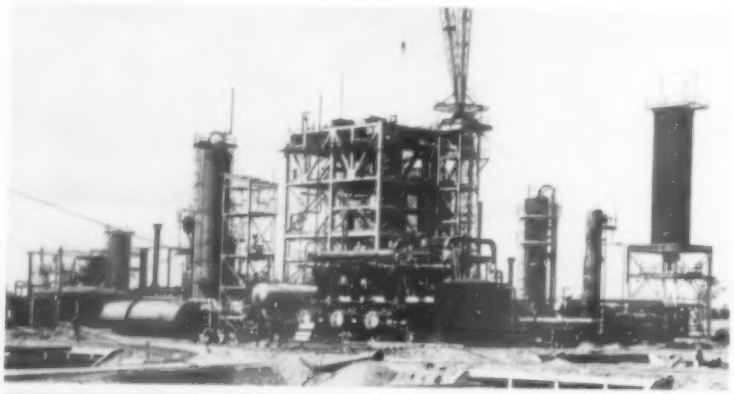
Low Production Costs..

In addition to these valuable economic considerations, the process requires comparatively low initial investment and operating expense. High pressures or temperatures are not used and consumption of chemicals such as alkalis and acids is comparatively low.

Work Progresses on Sasol Plant

Shown here are two major sections of the multi-million-dollar synthesis project now under construction by Kellogg in South Africa. While the primary purpose of the plant is to synthesize gasoline and other oil products from coal, it will also produce large volumes of valuable chemicals which will be purified in Kellogg-designed equipment. (Photo above shows fractionation equipment for both oil products and chemicals.)

Shown (below) well underway is the most important unit in the process sequence. This is the Kellogg Synthol unit which will catalytically convert synthesis gas to liquid hydrocarbon and chemical products. (See preceding page for further details on Kellogg's Synthol Process.)



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- ★ Nitric Acid
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obtained when the sand section adjacent to the fractured shale is thin in relation to the total sand thickness.

Previous studies have shown that if the breakdown fluid can be confined to the well bore, the fracture created will frequently extend along the axis of the well.[2] It can be readily seen that a fracture of this type will result in the fracturing of all sand stringers into which the well has penetrated.

The problem of obtaining a vertical fracture in a sand section interbedded with shales was tested in the laboratory, using a number of 4-in. cores selected from a Wyoming sand having the appearance illustrated in Fig. 1. Holes ⅜ in. in diameter were drilled down the center of each of the cores to provide a simulated well bore.

Scott, Bearden, and Howard[1] have shown that the internal pressures required to rupture thick-wall cylinders increase with increasing ratio of external to internal radius up to a ratio of approximately 10. At greater rates (10 to infinity) the pressures required to fracture do not increase measurably with increased wall thickness. The ratio of these tests (10.7) could, therefore, be expected for all practical purposes to be an infinitely thick cylinder.

A large number of these cores were hydraulic fractured using a number of different materials as breakdown fluids, and a record made of the fracture or the breakdown pressure and type of fracture formed. (Fractures across the bedding planes were termed vertical fractures, and fractures along bedding planes horizontal fractures.) These data are presented in Table 1.

From this table it may be seen that in conventional hydraulic-fracturing operations, horizontal fractures can be expected to occur most of the time in a sand formation containing interbedded shales. It can also be seen in Table 1 that generally higher pressures were required to cause the cores to break vertically. This is evidenced by the fact

TABLE 1—RESULTS OBTAINED WITH VARIOUS BREAKDOWN MATERIALS IN SANDSTONE CORES LAMINATED WITH SHALE

Breakdown fluid—	Average breakdown press., psi.	Per cent cores which fractured vertically†
Crude oil	990	0
Viscous refined oil (20 cc. fluid loss*)	1,690	40
Hydrocarbon gel	780	10
Oil base mud (0 cc. fluid loss*)	2,000	65
Oil base mud (0 cc. fluid loss*) with 25 lb./bbl. ground wanut shells	2,600	90

*A.P.I. RP 29 fluid-loss test. †Across bedding planes.

"...it appears to be a good possibility that vertical fracturing will prove to produce better results than horizonal fracturing in any open-hole section."

that the higher the percentage of vertical fractures, the higher the average breakdown pressure became. This duplicates the results obtained by Scott et al.,[1] and Clark.[2]

Field tests conducted . . . Based on the above study, attempts were made to vertically fracture four wells completed open hole in shaly sands in Wyoming. Four conventional fracturing treatments in similar wells in the same sand had previously produced no results or had responded with a good flush production which has then declined to the productions before fracturing within 60 days of the job. It was hoped that a good, stabilized production increase could be obtained if vertical fractures could be created.

The fracture treatments on these wells were similar to conventional fracturing treatments, except that instead of using crude oil as the breakdown fluid, the breakdown was made using oil-base mud (having a very low fluid loss under bottom-hole temperature) containing 25 lb. per bbl. of ground walnut shells. This oil-base mud was displaced into the open hole using a section of tail pipe below the packer sufficiently long to reach the bottom of the well.

After the oil-base mud had been placed in the well, the packer was set and a mild squeeze pressure applied and held until all the excess crude oil in the hole had been squeezed into the sand. When no more oil injection was required to maintain the pressure, the pressure was increased until the breakdown was obtained.

A sand plug was placed in the bottom of each well in an effort to prevent fracturing out the bottom of the well. From this point on, the well was treated in the conventional manner.

The breakdown pressures in these wells corresponded to the breakdown pressures encountered in the laboratory. The four wells fractured conventionally were broken down at surface pressures of approximately 700 psi. The breakdown pressures experienced during the vertical fracturing operations, however, varied between 2,800 and 3,700 psi.

No sharp break in pressure occurred during conventional treatment; however, during the vertical fracturing treatments, sharp well-defined breaks in pressure occurred during the breakdown.

Holds up longer . . . Prior to the tests, the four conventional treatments had resulted in production increases which held up for a maximum time of 2 months. Of the four test wells which were fractured vertically, one was held up for 10 months, two others for 3 months, and the fourth for 1 month.

The actual production increases obtained are somewhat difficult to evaluate due to pump capacity. The only well tested for maximum capacity increased from 35 bbl. of oil per day "pumping off" to 1,500 bbl. of oil in 36 hours, swabbing from 3,000 ft. off bottom.

The pumping fluid levels in all of the vertically fractured wells increased considerably, most of them flowing a portion of the oil produced through the pumps. The results of these tests are not as yet conclusive because, to prove the process, the wells must produce at the increased capacity for longer periods of time.

Spinner surveys were conducted on all four test wells before and after fracturing. These surveys showed substantial increases in permeability for long sections along the well bores. The results of these surveys are presented in Fig. 2 along with logs illustrating the characteristics of the sections fractured.

Laboratory work has been conducted on a number of Mid-Continent cores taken from sandstone formations not having laminations of shale. The results of these tests, presented in Table 2, indicate that as a result of conventional fracturing most fractures in these sands can be expected to occur horizontally or along the bedding planes. This data also indicates that the application of the vertical fracturing technique should result in the formation of vertical fractures.

With shale stringers . . . If future test

TABLE 2—RESULTS OBTAINED WITH VARIOUS BREAKDOWN MATERIALS IN CLEAN SANDSTONE CORES

Breakdown fluid—	Average breakdown press., psi.	Per cent cores which fractured vertically†
Crude oil	1,240	10
Viscous refined oil (20 cc. fluid loss*)	1,500	54
Hydrocarbon gel	1,600	10
Oil base mud (0 cc. fluid loss*) with 25 lb./bbl. ground walnut shells	3,000	97

*A.P.I. RP 29 fluid-loss test. †Across bedding planes.

results continue as favorable as data obtained to date, it is believed that the vertical-fracturing process will prove an effective method of stimulating formations completed open hole in the presence of stringers of shale.

In addition, it appears to be a good possibility that vertical fracturing will prove to produce better results than horizontal fracturing in any open-hole section. This is due primarily to the probability that good fracturing results are usually obtained by breaking through permeability blocks around the well bore. The vertical-fracturing process results in breaks through these blocks throughout the whole open-hole section, while horizontal fracturing will break a block only at one place in the well bore.

It is not believed that vertical fracturing will prove more effective than conventional fracturing jobs conducted through perforations. Past experience has shown that multiple fracturing usually occurs when treating through perforations, thus producing better results than usually obtained when treating open-hole sections.

This belief is substantiated by a number of wells in Wyoming completed through perforations in sands laminated with shales. The results of these treatments through perforations have been good and an increased, stabilized production has been obtained.

Caution near interface . . . It is not considered advisable at this time to fracture vertically any wells which are completed within 20 ft. of water table or a gas cap. Although there is no data available to substantiate it, there is a possibility that these fractures may be extended upward or downward into a gas or a water section. This might result in a serious increase in gas or water production.

It was not intended in this work that the laboratory data be used as absolute proof that fractures can be controlled in whether they are vertical or horizontal. These tests were used only as guides in planning field tests. The results obtained in field testing are considered to be the proof of the process.

Bibliography

1. Scott, P. P.; Bearden, W. G.; and Howard, G. C.: "Rock Rupture as Affected by Fluid Properties," Paper No. 205-G presented at the fall meeting of the petroleum branch, American Institute of Mining and Metallurgical Engineers, in Houston, Oct. 1-3, 1952.

2. Clark, Roscoe C., "Hydraulic Fracturing of Oil and Gas Wells," The Oil and Gas Journal, Sept. 14, 1953.

3. Patent Application, Ser. 383,119, "Vertical Fracturing Formations in Wells," Roscoe C. Clark, Jr., filed Sept. 29, 1953.

Field Tests Show Advantages of Vertical Hydraulic Fracturing

by Philip E. Bocquet, Russell W. Ankrom, Jr., and C. H. Hesser

FOR the initial field tests, wells were selected in the Sussex area of Wyoming in those formations which had not responded economically to conventional fracturing treatments. Because of the success of these tests, three wells have been treated also in North Texas and southern Oklahoma. The following was the procedure used:

1. The open hole was cleaned out.

2. A caliper survey of the open hole was run; first to evaluate the increase in permeability following fracture. Since spinner surveys measured only velocity in the bore, the dimensions of the well were needed for determining volumes lost to the formations. The other purpose was to determine the volume of the open hole section so that it could be filled entirely with oil-base mud.

3. A sand plug (about 3 ft.) was placed in the bottom of the hole to limit the possibility of fracturing out the bottom.

4. A packer was run on tubing with sufficient tail pipe so that the open end could be spotted several feet above the sand plug and the packer still be above the shoe.

5. With the open end of the tubing several feet above the sand plug, oil-base mud with 25 lb. per bbl. of medium-grade ground walnut shells was circulated in slowly. The entire open-hole section plus a small volume in the casing was displaced with oil-base mud.

It is important to displace all crude oil from the open-hole section since a conventional treatment would result if it were present.

6. With sufficient oil-base mud containing nutshells (about 12 bbl.) held in the tubing for the squeeze, the tubing was raised until the open end was near the shoe and the packer was set.

7. In order to displace any crude oil which may have been left in the open hole and to ascertain that the oil-base mud was confined to the hole, a squeeze was applied. The pressure was gradually increased in about 200-psi. increments to 1,000 psi.

8. After the 1,000-psi. squeeze pressure had been held for 15 minutes, and with the pump trucks manifolded for continuous operation, the wells were broken down by injecting fracturing oil.

9. As soon as a breakdown was obtained, 1 lb. of sand was added per gallon of fracturing fluid.

10. The sand oil was followed by a crude-oil flush.

Authors are with Continental Oil Co. From a paper presented at spring meeting of Rocky Mountain district, A.P.I. Division of Production, Casper, Wyo., April 8, 1954.

TABLE I

	Production before fracture		Stabilized production after fracture	
Well	B./D.	Liquid level above formation (ft.)	B./D.	Approx. liquid level above formation (ft.)
A	27	0	150	6,000
B	30	0	190	2,000
C	68	0	120	4,000
D	23	0	400	rising
E	2	0	(*)	....
F	35	0	125	6,000

*Low with 125 bbl. water per day.

The results of six field tests are shown in Table 1. As can be seen, the production in one well increased nearly twentyfold, but an average increase was threefold to sixfold.

For Well "B," which was vertically fractured in November 1953, 3 years' accumulative production prior to fracture was about 50,000 bbl. During 3 months following fracture nearly 18,000 bbl. of oil was produced. Therefore, average production has increased from 1,400 to 6,000 bbl. per month.

One characteristic of several wells was that production increased from day to day immediately following treatment. This delay in reaching maximum production has been attributed to the temporary blocking effect of oil-base mud. However, crude oil present in formation should cause thinning of the oil-base mud to eliminate this effect.

For example, Well "D" which produced 23 bbl. of oil per day before fracture, was swab tested at 122 bbl. of oil in 12 hours immediately following treatment. Next day it pumped 140 bbl. of oil; 5 days later it was pumping and flowing nearly 400 bbl. of oil per day with liquid level rising.

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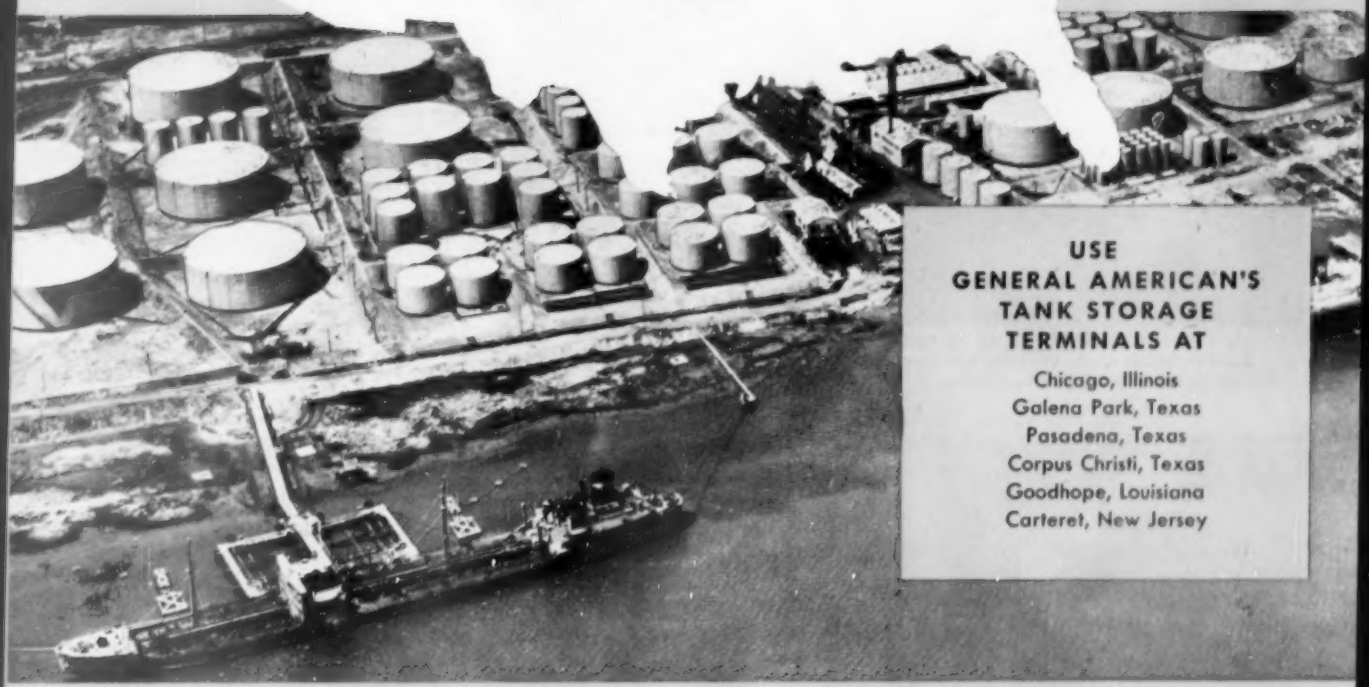

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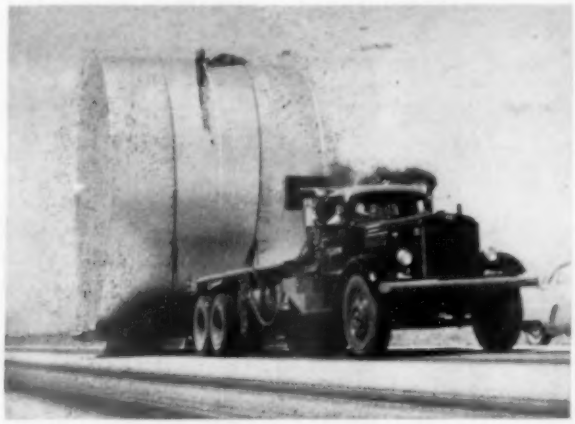
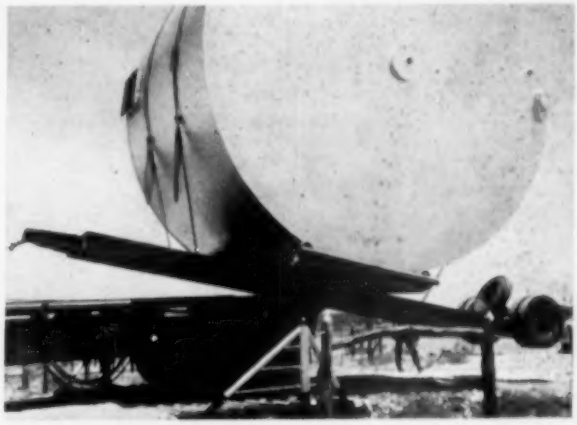


ON THE HIGHWAY, handling the tanks on their sides meets legal limits and is cheaper and safer as well.



CLEARING OBSTRUCTIONS is achieved by winching the load, low-boy and all, up onto the truck.

New Hauling Method Simplifies Tank Moving

A NEW twist in handling heavy, shop-welded tanks makes it both quick and easy for two men and a single truck to haul and set 1,000-bbl. cone-bottom tanks.

Sivalls Tanks, Inc., Odessa, Tex., is using a system of hauling cone-bottom tanks on their sides as a result of 20-ft. limit on width of loads on Texas highways. The method also makes the operation cheaper, faster, safer, and easier on the tank.

Paved highways with wide shoulders make the Permian basin suited to this type shipment. Crews can navigate under utility wires, through narrow cattle guards, over rough and hilly roads, down city streets, on heavily traveled highways, and even through deep sand.

Typical of this type operation was the recent movement of two tanks from Odessa to Cities Service Oil Co.'s Parks lease in southwestern Midland County. The route, designed to avoid a heavily traveled highway, covered about 35 miles.

The tanks—fabricated with bottoms, shells, and decks of ¼-in. steel—weighed 19,900 lb. each. Chained to a specially constructed skid or cradle, the weight approximated 11 tons.

Key to success of this type of shipment is that the tank is secured on its side in the cradle in the shop. With the tank chained and boomed in the cradle, the trucker handles the load with his winch line in the same manner as any other heavy, skid-mounted piece of equipment.

The tank itself is 21 ft. 7 in. in diameter and 16 ft. high. With the tank placed on its side, the load is approximately 19 ft. wide. The extra width lies in a 12-in. sump and approximately 2 ft. in the cone area of bottom and deck. Shipping height is about 23 ft. including 12 in. of low-boy trailer and 6 in. of cradle.

The bottom of the low boy is a network of smooth steel beams which allow the vehicle to ride over or smooth out rough places in unpaved roads and avoid damage to cradle and tank.

The cradle is boomed crosswise on the low boy so the long dimension of the tank runs from front to rear. A large tandem truck handles the load, pulling the low boy on smooth stretches of road where there are no side clearance problems. It is a simple matter to winch the load, low boy and all, up onto the bed of the truck to insure clearance in narrow cattle guards, over fence posts, over cars parked on the road, to clear large rocks, signs, bridge railings, and other obstructions.

The problem of low-hanging utility wires is met (1) by using routes avoiding such wires, (2) by making advance arrangements with utility companies, or (3) by elevating the wires with special "wire lifters."

With the grade already prepared for the battery and with preparation for placement of cone bottoms, a 1,000-bbl. tank can be unloaded from the low boy, backed onto the grade, set in place in less than an hour after arrival.

Shipping of cone or flat-bottom tanks of smaller capacities than 1,000 bbl. is handled in a similar manner, except that smaller tanks are hauled straight on the low boy rather than crosswise.

Facility of handling large storage tanks was demonstrated recently when two 1,000-bbl. tanks were needed for emergency service at the scene of a fire on a wildcat 25 miles west of Jal, N. M. The tanks left Odessa at 9 a.m., followed generally paved roads about 65 miles to Jal, covered 25 miles of sandy oil-field roads, and were on the location ready for hookup by dark the same day.

Inspecting Sucker Rods Electronically

EQUIPMENT developed to inspect sucker rods in the field consists of a magnetic-type detector, a scraper, driving rollers, recording apparatus with amplification units, and racks with builtin rollers for guiding the rods. A rod is placed on a guide rack and fed into the initial drive mechanism. This consists of two rollers, with the upper one spring loaded and both upper and lower rollers chain-driven by a builtin electric motor. Those force the rod through a scraper consisting of four hollow-ground knife blades which fit around the circumference of the rod. Paraffin and scale are removed from the rod so the magnetic detector shoes can make good contact.

The rod next passes through the detector, where the area under examination is subjected to a strong longitudinal magnetic field of varying in-

tensity. The change of permeability of the metal is recorded by a stylus-recorder mechanism. If a fatigue crack or stress concentration area is encountered, the permeability of the metal decreases, and the change is indicated by a deflection of the recording galvanometer. Since the rod is magnetized close to the saturation point, any area of abrupt change in hardness, discontinuity, or stress concentration will not be able to pass all the flux lines set up by the electromagnet. Therefore, a certain number of lines are forced around the point. A pickup of these lines is amplified and recorded on a tape as it passes through the recording unit.

The rod travels into a second drive roller which sends it onto a receiving rack. It is then color-stripped and centerpunched according to the classification, as decided by the operator.

Recording tape . . . Two separate signals are picked up from the detector, amplified, and recorded on the tape. One of these is for the upper half of the rod and the other for the lower half. While the rod is being forced through the detector at a constant speed of 55 ft. per minute by the driving rollers, the signal is being recorded at the same time, with 1 in. of tape being equivalent to the travel of 6 in. of rod.

The operator observes the two signals on the tape and at any questionable variation in them, throws a switch which stops both the tape and the rod, the driving mechanisms of both being synchronized. Next, he sprinkles magnetic powder over the portion of the rod just leaving the detector. This makes it possible to pinpoint the location of the defect and to definitely identify fatigue cracks as against some forms of pitting plus fatigue cracks which cannot be determined from the tape indication alone.

Depending upon the condition of the rod, number and type of imperfections, etc., it receives one of the following classifications:

1. New rods in good condition—white band of paint.

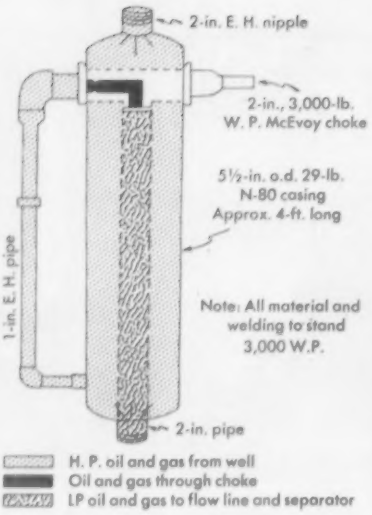
2. Used rods in good condition—yellow band of paint.

3. Limited service rods—blue band of paint.

4. Defective or scrap rods—red band of paint.

Main purpose of the inspection is to highlight the fatigue cracks in the rods and contributing factors which lead to stress concentration and fatigue failures.

Sucker-rod inspection is performed by Tuboscope Co., Houston.


2-in. E. H. nipple
2-in., 3,000-lb. W. P. McEvoy choke
5½-in. o.d. 29-lb. N-80 casing Approx. 4-ft. long
1-in. E. H. pipe
Note: All material and welding to stand 3,000 W.P.
2-in. pipe
H. P. oil and gas from well
Oil and gas through choke
LP oil and gas to flow line and separator

CUTAWAY of the defroster unit.

IN OPERATION at the well site.

"Choke Defroster" Prevents Freezeups

NATURE has been put to work as a means of preventing freezeups of tubing chokes on high-pressure flowing oil wells.

By use of a "choke defroster," designed by L. A. Bell, district production superintendent for Sinclair Oil & Gas Co. at Oklahoma City, and his assistants, production goes on uninterrupted without need for a regular-type line heater.

The defroster utilizes the high-pressure oil and gas itself (which is at formation temperature) to do the job. The high-pressure oil and gas is circulated around the choke, heating it, and preventing freezeup of the choke when the pressure is greatly reduced (see drawing).

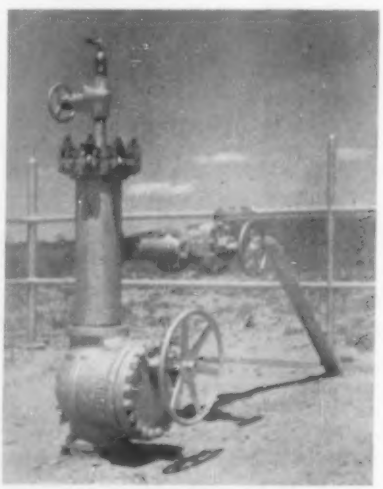
Icing troubles encountered . . . In November 1952, Sinclair drilled 1 Comm. Willie Smith in McClain County, Oklahoma, and completing it for a flow of 1,463 bbl. of oil in 18 hours, with tubing pressure of 1,600 to 1,900 psi.

Allowable was set by the state Corporation Commission at 300 bbl. daily. Choking the well down to this rate of production caused the choke to freeze. The allowable for the well later was cut further to 195 bbl. daily in the spring, and the freezing problem increased.

Remedy . . . The company planned to install a line heater, but Bell and his assistants contrived, constructed, and installed the defroster on the well instead. Since the fabrication of this unit cost only $162 as compared to approximate cost of $2,741 for installation of a line heater, the idea saved the company about $2,579 on one installation alone.

The only trouble that the pumper servicing this well has encountered on the choke defroster was due to paraffin. However, by merely closing and opening the choke a few times periodically, it again operates satisfactorily.

Choke defrosters of this type have been installed on three other Sinclair wells where it would have been necessary to install the line heaters. The company reports that the defrosters operate efficiently when there is sufficient fluid.



It's a Time-Saver!

ON shallow gas wells on the edge of the Hugoton field, where it is sometimes necessary to swab the wells, a simple well head has been de-

vised to save time in placing the oil-saver.

The top flange connection is made quick acting by having slotted bolt holes on the upper part. The bolts themselves are hinged on the lower part and can be swung out after the nuts are loosened slightly.

If the well loads up and requires swabbing, the top of the flanged connection can be removed and the oil-saver installed in a minimum of time. Swabbing may then proceed with the fluid going to the drip in the gas line or into a pit.

A MINIMUM of connections remain above-ground with this christmas tree arrangement.

Fewer Connections...

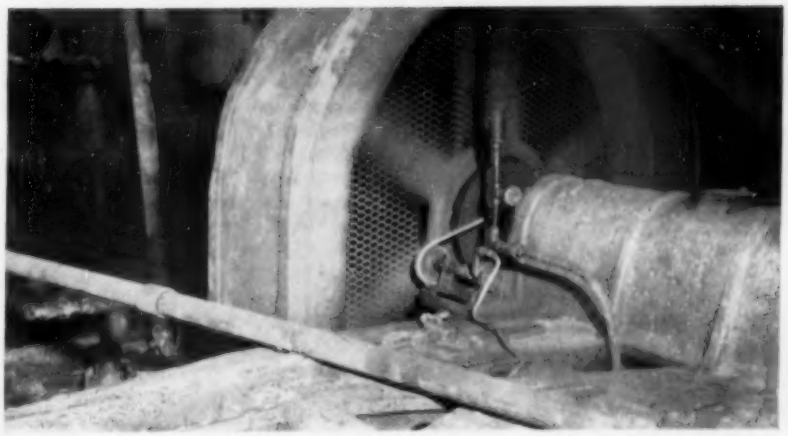
WHEN pressures are low, operators in fields such as Tex Harvey in West Texas cut the "pig iron" to a minimum. As soon as the well is completed and the oil string run, nippling up is done so that the casing head remains in the cellar.

The top collar of the tubing is set about a foot above the ground. This allows the cellar to be covered over with planking and connections are made above the ground as simple as possible.

The master valve is screwed to the top of the tubing head through a short bastard nipple with a production tee and the usual swage, needle valve and gage on top. An adjustable choke is placed on the line so that it turns the flow line back down into the cellar. A swing connection is made to run the flow line underground toward the tank battery.

On this well the line was run first to the pits until the well was swabbed in. Then it was connected to the separator for final cleaning up of the well.

This arrangement makes for a cleaner lease and fewer connections.



INSTALLATION of the small centrifugal pump is just ahead of the main power shaft.

Simple Addition Improves Old Mud Pumps

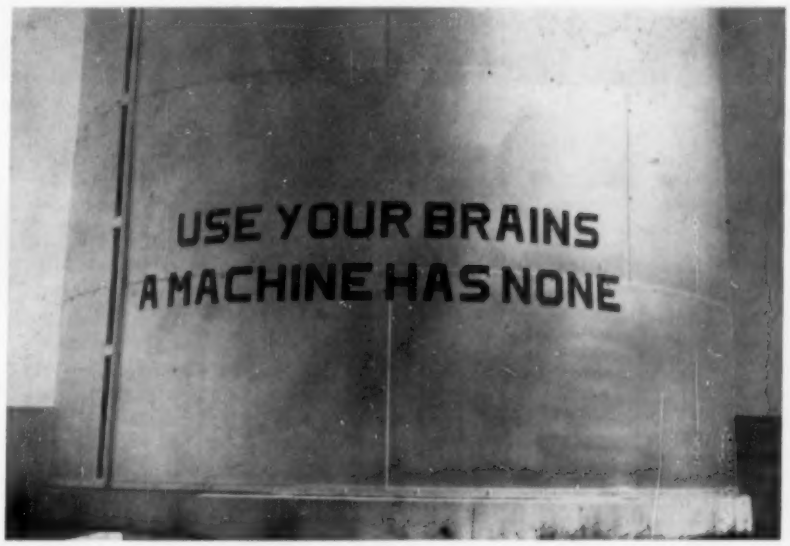
ON those older-model mud pumps where lubrication of the fluid end is by running water, a simple addition may be made that will provide light oil instead of water to lubricate the rods and lengthen their lives many times over.

A small centrifugal pump is set in slots of angle iron welded to the top of the pump frame just ahead of the main power shaft. A V-belt is then installed around the main drive shaft and tightened by means of the slots in the angle iron.

The discharge lines of the oil pump are run to each of the packing glands on the mud end, and a petcock installed on each of the lines to make the lubricant to spray against the rods. The drains at the bottom of the space below the rods are connected to a sump where mud and water leaking through the glands can settle out. The suction of the oil pump picks the oil up for circulation near the top of the sump to provide clean oil to the pump. Once a tour, the sump is cleaned out, the oil checked, and thin oil added as necessary.

If it is necessary to prime the pump, it is done through a funnel mounted on the suction line just above the tee leading into the pump.

Many times it is necessary to run the mud pumps before water has been connected into them. This method always provides for a steady flow of lubricant which is more effective than water.



Safety Slogan...

...appearing on a reservoir tank of Tennessee Gas Transmission Co. at Portland, Tenn.

WATERFLOODING WITH PURCHASED

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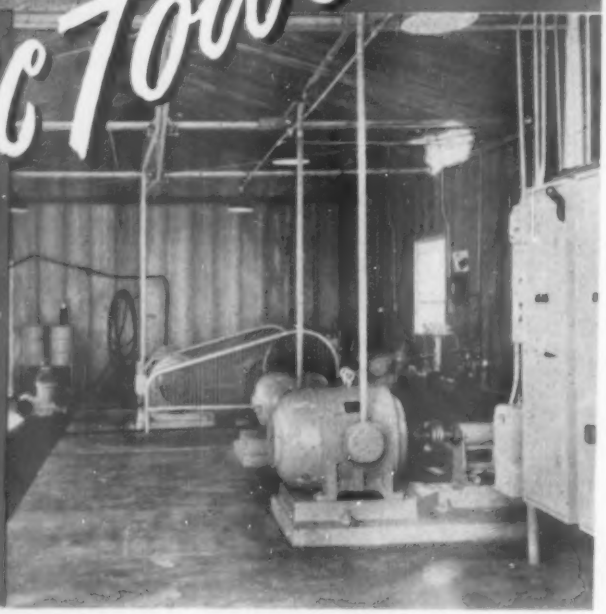

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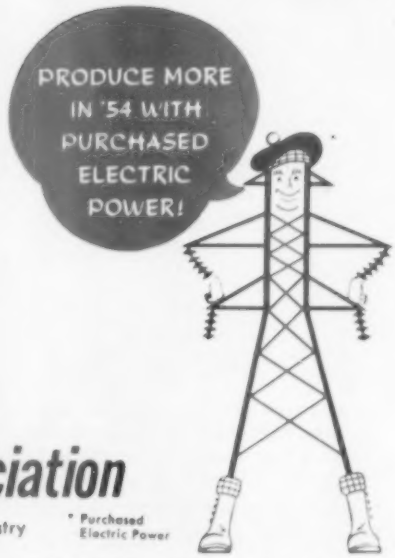

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New Slide Rule Simplifies Viscosity Calculations

by Herbert C. Fries

A NEW slide rule, known as a "Viscocalculator" has been devised for determination of viscosities and related constants of lubricating oils and other viscous liquids.

With this rule:

1. Viscosities can be calculated quickly at any temperature from two known viscosities.

2. Results can be converted into units of other systems such as kinematic (centistokes) or commercial (Saybolt, Engler, or Redwood).

3. Viscosities at low temperatures can be obtained down to —20° C. or at higher temperatures up to 150° C.

4. Viscosity-blending calculations can be made easily from a special diagram on the runner.

5. The slide rule can be used to determine the viscosity index (Dean and Davis), viscosity pole height, the m-constant, and the W-value (Ubbelohde-Walter).

Author is general superintendent of refining for Empresa Petrolera Fiscal, Peru.

Calculations with this new device are based on the following empirical formulas involving viscosity:

1. W-value:

$$W = \log \log (Cs. + 0.8)$$

2. m-Constant:

$$m = \frac{W_1 - W_2}{\log T_2 - \log T_1}$$

where, $\log T = \log (273 + t^\circ C.)$

3. W_p (viscosity pole height):

$$W_p = \frac{0.0992\, m + W_{50^\circ F.}}{1 - 0.194\, m}$$

4. Viscosity index (Dean and Davis):

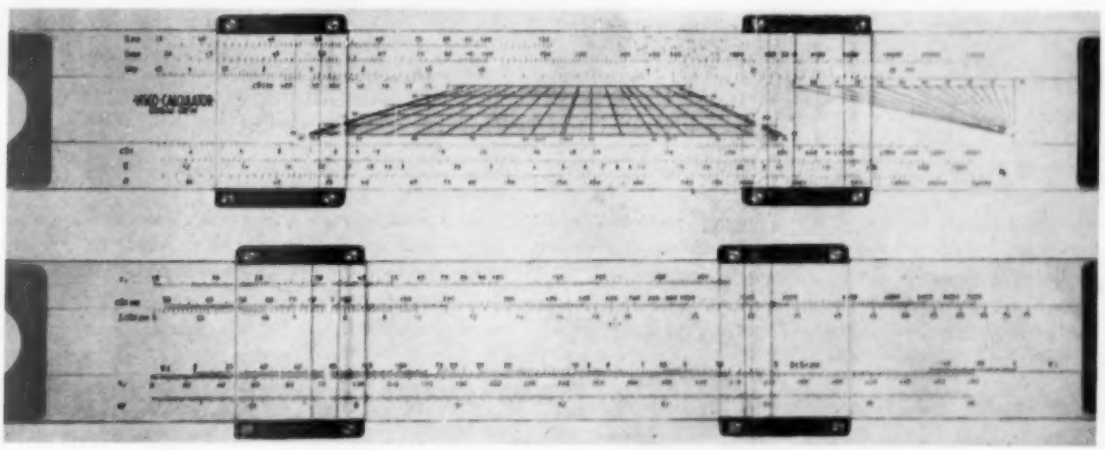
$$V.I. = \frac{L - U}{L - H} \times 100$$

Viscosities in S.s.U at 100° F.
L for Gulf Coast oil
H for Pennsylvania oil
U for oil being analyzed or calculated

Viscosities at 210° F. are to be equal for the three oils.

The basic operation, relating two known viscosities of the analyzed oil at different temperatures, is carried out as usual. The hairlines of the two runners are set on the viscosities which have been determined by a Saybolt, Redwood, Engler, or kinematic viscosimeter. Then the slide is moved until the two hairlines cover the crossing which corresponds to the test temperatures of the analysis and the m-value encountered in the horizontal section of the trapezoid on the slide (see picture). In this way, the m-value is determined. Leaving the slide in this position, the viscosities expressed in terms of any conventional or absolute system can be read between the temperatures of 20° to 100° C. and 70° to 210° F.

Conversion of units . . . In going from one system to another, one hairline is set over the known value and under the same line all corresponding values of the other systems are found.



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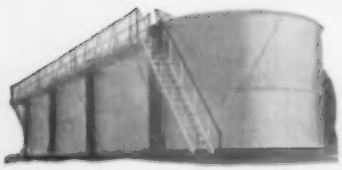

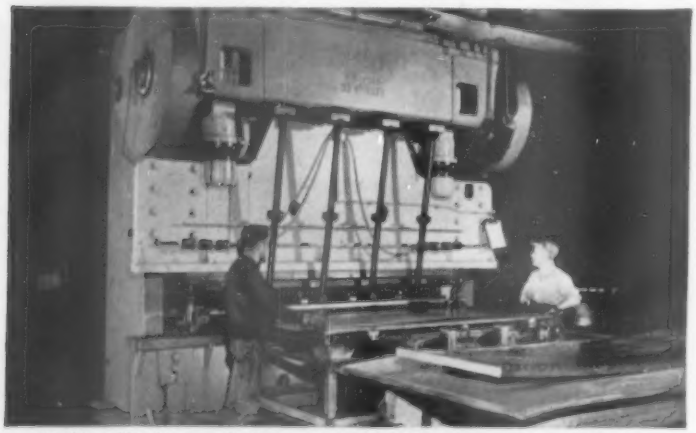

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Fluid Displacement in Linear Floods—3

by Dr. R. F. Nielsen

IN experiments with cores having the same relative permeability-saturation relations, the same water-oil viscosity ratio, and the same initial saturation S_i, then the f-F-S curves would be the same. It should then be possible to obtain the saturation distribution in the "stabilized" zone by integreting Equation 1 of the previous installment:

$$\Delta x\,(S_1 \text{ to } S_2) = \int_{P_c(S_1)}^{P_c(S_2)} \frac{F\,k_o K\,dP_c}{v\mu_o\,(f - F)} \qquad (1)$$

These scaling factors are not necessarily "dimensionless groups" as used in dimensional analysis. Neither are the successive experiments "models" of each other or of oil field wells. Value of these "scaled" experiments is that breakthrough recovery (in pore volumes) may be determined, by extrapolation, for zero value of the scaling factor.

Over-all residual saturation at breakthrough should, in fact, be a linear function of the above group (Fig. 1). As the value of the group becomes small, (L or v large, for instance) breakthrough recovery approaches the value corresponding to a negligible extent of the frontal, or capillarity, zone. Such is usually the case in field water drive.

There are other limitations on the scaling properties of horizontal floods. The extent of a stabilized frontal zone must be shorter than the core; there is a maximum value of the scaling factor.

With the conditions given above, f, F, k_o, and P_c bear the same relation to saturation for all experiments, if K is constant. The length Z of the stabilized zone is therefore proportional to $1/v\mu_o$ (or to $1/v\mu_w$, since the viscosity ratio is constant). Hence $L\mu v$ or its reciprocal is a "scaling factor" for the series of experiments.

Author is associate professor, petroleum and natural-gas engineering, Pennsylvania State College.

Rapoport and Leas checked this experimentally for a series meeting the requirements. Their equation, which contains $(L\mu v)^{-1}$ as one coefficient, is easily derived by differentiating Equation 1 with respect to x, substituting $-(\psi/v)\,(\partial S/\partial t)$ for $\partial f/\partial x$ (continuity equation), XL for x, and $TL\psi/v$ for t.

Equation 1 gives the length of the stabilized zone if the limits are S_1 and S.* It is apparent that the average saturation in the zone is constant even if $v\mu$ varies, since the relative distances between successive values of S are retained when dealing with the same P_c-S curve.

Moreover, P_c is proportional to $\nu \cos \Theta$, where ν is interfacial tension and Θ a "statistical" contact angle. Also P_c is inversely proportional to capillary diameter which for similar textures is proportional to $(K/\psi)^{1/2}$. Thus the group $\nu \cos \Theta\,(K\psi/Lv\mu)^{1/2}$ is theoretically a scaling factor for breakthrough recovery, if the shapes of the relative permeability and capillary-pressure curves and the viscosity ratio is constant.

These scaling factors are not necessarily "dimensionless groups" as used in dimensional analysis. Neither are the successive experiments "models" of each other or of oil-field wells. Value of these "scaled" experiments is that breakthrough recovery (in pore volumes) may be determined, by extrapolation, for zero value of the scaling factor.

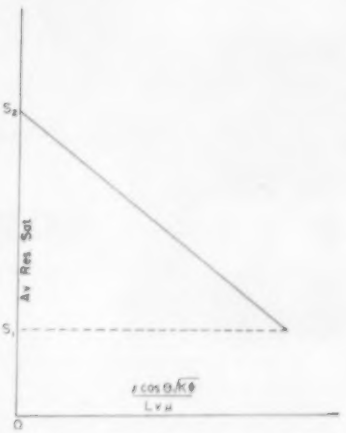

Fig. 1—Theoretical relation between "scaling factor" and recovery at water breakthrough, in pore volumes.

Over-all residual saturation at breakthrough should, in fact, be a linear function of the above group. As the value of the group becomes small (L or v large, for instance), breakthrough recovery approaches the value corresponding to a negligible extent of the frontal, or capillarity, zone. Such is usually the case in field water drive.

There are other limitations on the scaling properties of horizontal floods. The extent of a stabilized frontal zone must be shorter than the core; there is a maximum value of the scaling factor.

Furthermore, a certain amount of time and flow is necessary before the frontal zone is stabilized. The stabilized front should be sufficiently larger than the core length to allow time for stabilization before reaching the core end.

The above group is not always a scaling factor for recovery (or for average residual oil) under the conditions mentioned. If cores are slightly heterogeneous, the displacing phase might flow in "fingers" ahead of the main flood front. This is especially pronounced when the displacing phase is the wetting phase and when it is much less viscous than the displaced phase.

Under such circumstances quantities in the above group may not govern length of the frontal zone according to theory, or the zone may not acquire a constant length before water breakthrough. It is also possible that saturation distribution might vary so that average saturation is not a constant.

The mathematical theories apply most consistently with displacement of wetting by nonwetting fluid.

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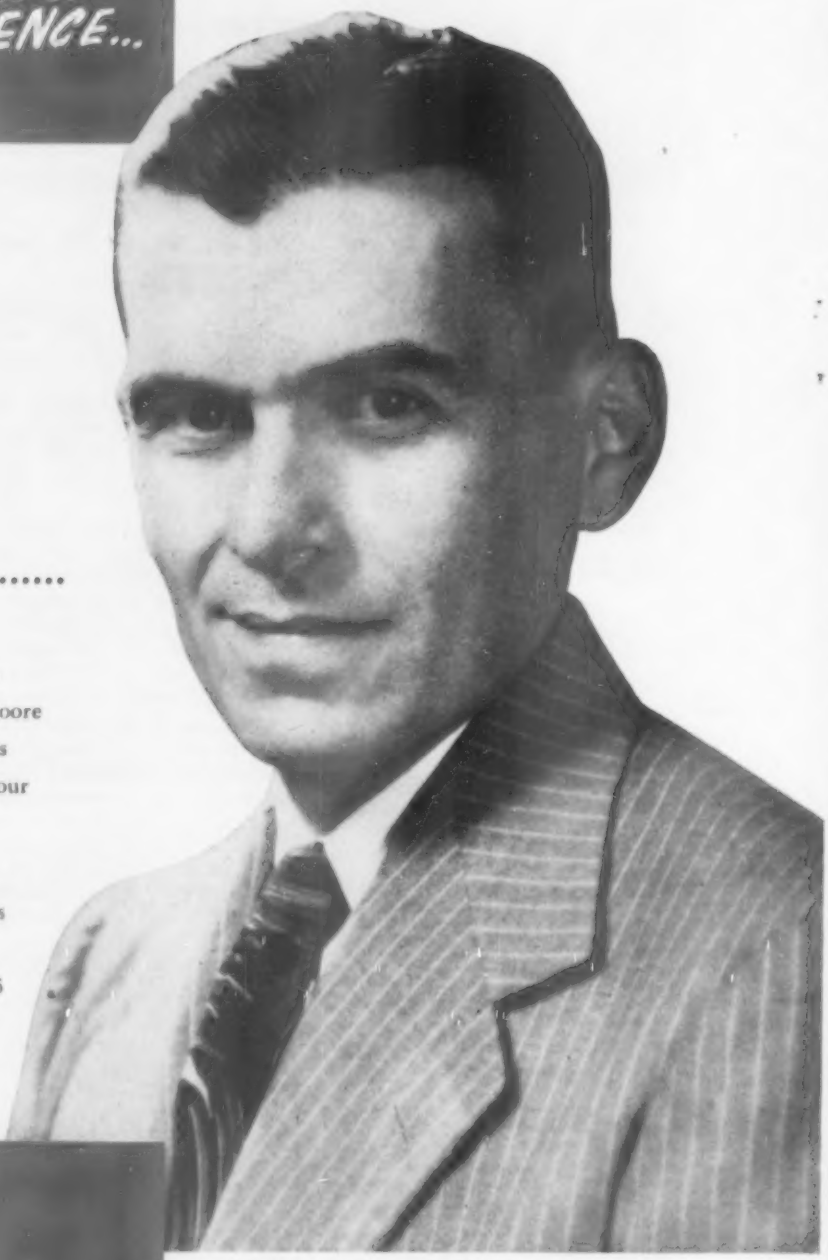

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J. E. Harrell is Lee C. Moore Northern Division Manager and is one of the sales consultants available to companies in the northwest and Canada. His over 25 years experience can be put to work for you when you need any type of drilling structure.

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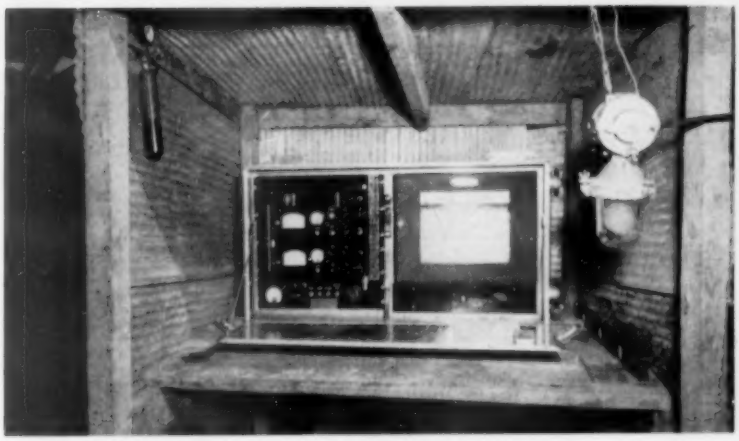


FIELD INSTALLATIONS of the gas recorder can be housed in open-front sheds . . . preferably near the flow line.

New Exploration Tool Aids Wildcat Drilling

by Norman S. Morrisey
Drilling-Development Editor

THE Automatic Recording Gas Detector is a new tool for recording oil and gas shows which is now available to exploration and field development geologists through Baroid Well Logging Service, Houston. Twenty units are now in operation and the success of the instrument under field conditions has been proved.

Unit readily installed . . . The unit is readily installed and can be easily maintained by wellsite geologists with a minimum of instruction. It is housed in a weatherproofed and compact aluminum cabinet (4 by 2 by 1½ ft.) that weighs about 350 lb. The detector requires less than 300 watts and can be operated from any 115-volt source, either a.c. or d.c.

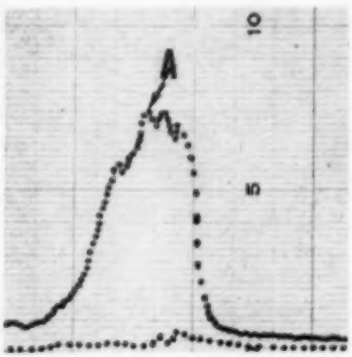
It can be set up in a semiprotected area near the flowline or may be installed in the geologist's field trailer or "sample" house. The latter arrangement is particularly effective because the geologist can watch it closely while examining samples.

The instrument . . . Essentially, the instrument is a portable version of the newest gas detecting and recording equipment. It consists of three elements: a continuous mud gas detector; a gas recorder, and a cuttings gas detector.

The continuous mud-gas detector is a hot-wire gas detector with a new-type vertical-agitation trap that removes the gas from the mud being analyzed.

The gas recorder is a continuous recorder that registers automatically the total gas and methane curves from the mud-gas detector. An alarm horn is incorporated into this instrument to warn the geologist or engineer of increases in gas readings.

Valuable tool for geologists . . . The Automatic Gas Recording Detector is an inexpensive and valuable tool for exploration and field geologists.



PORTION of a chart from the Automatic Gas Recorder. The gas show at A was confirmed by drill-stem test. (Courtesy Baroid Well Logging Service.)

The detector helps the geologist and engineer in:

1. Determining coring points.
2. Determining which zones to drill-stem test.
3. Selected side-wall coring points.
4. Interpreting electric logs.
5. Warning against possible blow-outs.
6. Selecting perforating zones.

How it operates . . . Mud from the flow line passes into a chamber and the gas is removed from the mud. This gas is then passed over a hot-wire filament. Ignition of the gas changes the resistivity of the wire filament; this change in resistivity throws the wheatstone bridge out of balance. The gas content of the mud is recorded automatically as a change in current across the bridge.

Operational costs . . . Cost of the instrument is nominal, running about $20 per day or $600 per month.

This instrument is a definite asset to the wellsite geologist or engineer, but it will not eliminate the need for technical personnel. It will not completely replace mud-logging trailer units which analyze the gas content of the mud and also log and analyze the well cuttings.

We're talking to you! . . .

Sorry we had to shout, but here are some facts you ought to know.

The correct operation of any type of lease tank can be assured by the insistence of the buyer that the tanks be equipped with hatch valves that are known to give long and trouble-free service. The difference in cost is negligible when you consider the loss of vapors and volume caused by an inoperative hatch valve.

We at Enardo stand behind all our products. We keep several men continually on research and development of new and better ways to make our products give more efficient service.

We are proud to say that many of our products are still giving good service in the field after twenty years on the job.

If we offended you by shouting, we're sorry. But if you're looking for the best — insist on the Enardo label.

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How Gas Constants Enter Into Design and Performance—4

by Sherman L. Cole

IT has been shown in preceding installments that, independent of other gas constants, "K" value has a decided effect upon internal hydraulic proportions of a centrifugal compressor. In general, it takes "more machine" to attain a given discharge pressure with high "K"-value gases than with low "K"-value gases. This can be in the form of one or a combination of the following:

1. More stages.
2. Larger-diameter impellers.
3. Increased speed.
4. Wider impellers (particularly in the latter stages).
5. Impellers with different blade angles and hydraulic characteristics.

Effect of gas constants . . . Although it is beyond the scope of this article to present the theory and calculations behind Fig. 2, this chart has been prepared to show the theoretical effect, on a single-casing centrifugal compressor designed to handle a given gas, of any one of the gas constants changing from its original value. Why the effects of the variables shown are theoretical and not actual will be discussed later.

The dashed curves represent performance if the unit is operated on gas with characteristics for which it was originally designed. The effect of any one of the gas constants changing is shown by the solid curves. Should the gas constants vary in the opposite direction, then effects on performance would be converse to that illustrated.

Adiabatic head . . . The significance of the entire curve is obvious with the exception of the horsepower curve remaining constant for changes in pressure caused by varying "K" value and supercompressibility factor at discharge. To explain this, it is necessary to define the term "adiabatic head."

By strict definition, adiabatic head is the theoretical work required to compress 1 lb. of gas adiabatically from intake to discharge pressure. This is expressed in foot-pounds per pound. However, such a definition does not necessarily clarify the exact context of head as used in centrifugal-compressor work. Further, it doesn't fully show the convenience of using head to interpret various performance characteristics of turboblowers.

The simplest way to understand performance characteristics of a centrifugal compressor is to think of it as handling so much capacity at a given head. This type of interpretation is illustrated in Fig. 3. In order to attain a desired discharge pressure when handling a gas with given characteristics and with a given intake pressure and temperature, how much head must be developed, i.e., how many feet of gas must be "supported" at the compressor discharge flange in order for the weight of the gas column to result in the desired discharge pressure at the base of the column when the top is at inlet pressure, temperature, and density.

Adiabatic or polytropic? . . . Since a turboblower handles a compressible fluid, obviously the rate of change

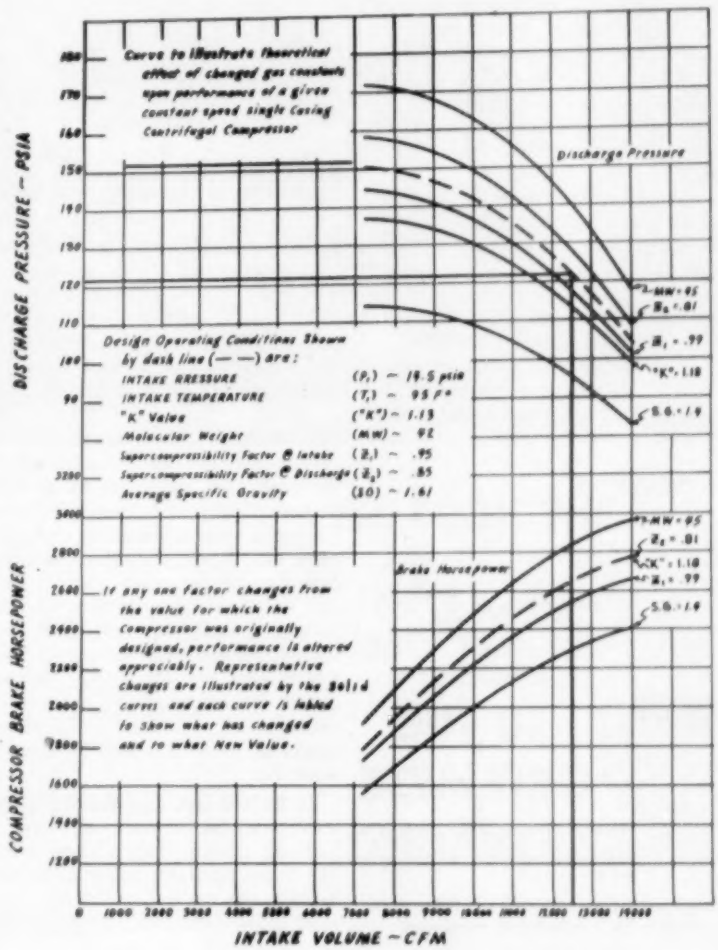
Curve to Illustrate theoretical effect of changed gas constants upon performance of a given constant speed single Casing Centrifugal Compressor
Discharge Pressure
Design Operating Conditions Shown by dash line (— —) are:
INTAKE PRESSURE (P1) ~ 19.5 psia
INTAKE TEMPERATURE (T1) ~ 95 F°
"K" Value ("K") ~ 1.13
Molecular Weight (MW) ~ 92
Supercompressibility Factor @ Intake (Z1) ~ .95
Supercompressibility Factor @ Discharge (Z2) ~ .85
Average Specific Gravity (SG) ~ 1.61
If any one factor changes from the value for which the Compressor was originally designed, performance is altered appreciably. Representative changes are illustrated by the Solid curves and each curve is labled to show what has changed and to what New Value.
Brake Horsepower
DISCHARGE PRESSURE - PSIA
COMPRESSOR BRAKE HORSEPOWER
INTAKE VOLUME ~ CFM

Fig. 2—Theoretical effect of a change in gas constants.

Author is engineer with Ingersoll-Rand Co., Phillipsburg, N. J., turboblower department.

of gas density along the gas column influences the "feet of head" required for equivalent weight (pressure) at the base. Thus, we must specify a type of compression in order to account for this change in density. If compression along the column is assumed to be adiabatic, then we can calculate the adiabatic head that must be developed. Here again, designers are interested in "polytropic head," but for application work adiabatic head serves as a convenient theoretical yardstick, and it is possible to account for the actual deviation from it by using various constants, including adiabatic efficiency.

Brake horsepower of a centrifugal compressor equals:

$$\frac{\text{Pounds per minute} \times \text{adiabatic head}}{33{,}000 \times \text{adiabatic efficiency}}$$

Also, theoretically speaking, a given centrifugal compressor will develop the same head regardless of the characteristics of the gas it is handling or the operating conditions. (This is not true because it assumes that flow areas can be altered to account for varying rates of density change as gas passes through the machine.)

Now we can return to Fig. 2. Since the same pound per minute of gas is being handled and at theoretically the same head, the horsepower will remain constant for varying "K" value and varying supercompressibility factor at discharge even though the discharge pressure changes. It might be in order to state that in an actual machine this would not be the case. The power would drop off for the change in "K" value shown and would increase for the change in supercompressibility factor at discharge shown. Further than this, we can make the following observations regarding the deviation of an actual unit from what is illustrated by Fig. 2 on a theoretical basis:

1. Pressures and horsepowers would be higher than those examples showing increased pressures.
2. Pressures and horsepowers would be lower than those examples showing decreased pressures.
3. The pumping point would move to the right for increased pressures.
4. The pumping point would move to the left for decreased pressures.

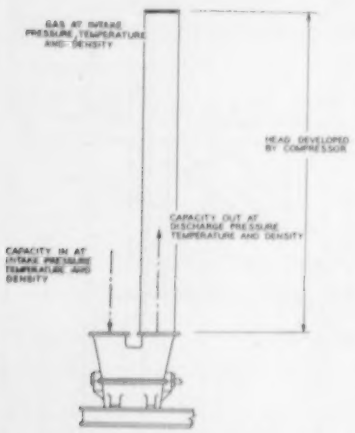
GAS AT INTAKE PRESSURE, TEMPERATURE AND DENSITY
HEAD DEVELOPED BY COMPRESSOR
CAPACITY OUT AT DISCHARGE PRESSURE TEMPERATURE AND DENSITY
CAPACITY IN AT INTAKE PRESSURE TEMPERATURE AND DENSITY

Fig. 3—Performance characteristics interpretation for a centrifugal compressor.

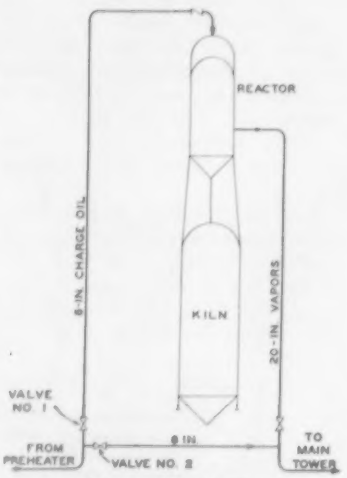

Fig. 1—Old scheme.

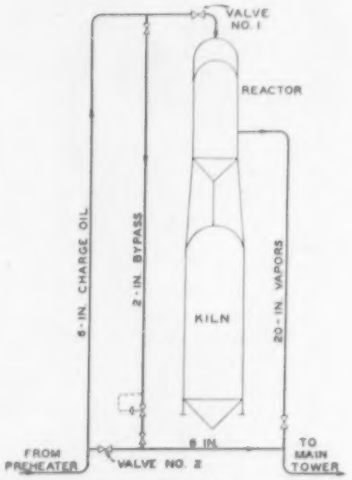

Fig. 2—New scheme.

Minor Piping Change, Major Benefit

A RELATIVELY simple change in piping of the charge oil to the reactor of the Houdriflow catalytic cracking unit at Tide Water Associated Oil Co.'s Drumright, Okla., refinery brought Omer E. Irvin suggestion awards totalling $1,100.

Old scheme . . . In preparation for putting the unit on stream after a shutdown, the oil is heated to the desired reactor inlet temperature in the preheater and circulated through valve No. 2 (see Fig. 1) in the bypass line to the main tower. The unit is placed in operation by admitting a small flow of oil to the reactor through valve No. 1. The rate is kept low for a short period and is then increased to full-charge rate as the catalyst temperature comes up to normal level by closing valve No. 2.

In the old scheme, some 90 ft. of 6-in. pipe was between valve No. 1 and the reactor inlet. When valve No. 1 was opened to admit oil to the reactor, the oil had to fill the long riser before reaching the reactor. No matter how well this line was insulated, filling it resulted in a temperature drop so that the oil initially entering the reactor was colder than desired. With both catalyst and oil below normal cracking temperature, catalyst purge was not up to normal efficiency so that some oil was carried into the kiln and resulted in some difficulty with kiln temperature control.

New scheme . . . With valve No. 1 located close to the reactor as in the new scheme, and with an added 2-in. bypass line starting just upstream of valve No. 1, the oil-inlet line is fully warmed during preliminary oil circulation. Then oil initially admitted to the reactor is at the desired temperature. Reactor purge is better, kiln operation is smoother, and start-up time is saved. This scheme is particularly beneficial when the unit is started up with charge stock, including heavy-vacuum gas oil, of full boiling range, since such stock is only partially vaporized at the preheater outlet conditions.

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Custom built electrostatic units engineered by Howe-Baker have the "bugs" removed before each design leaves the drawing board. That's why refiners using Howe-Baker installations on three continents are getting trouble-free operation in treating over 1,000,000 barrels of crude oil per day.

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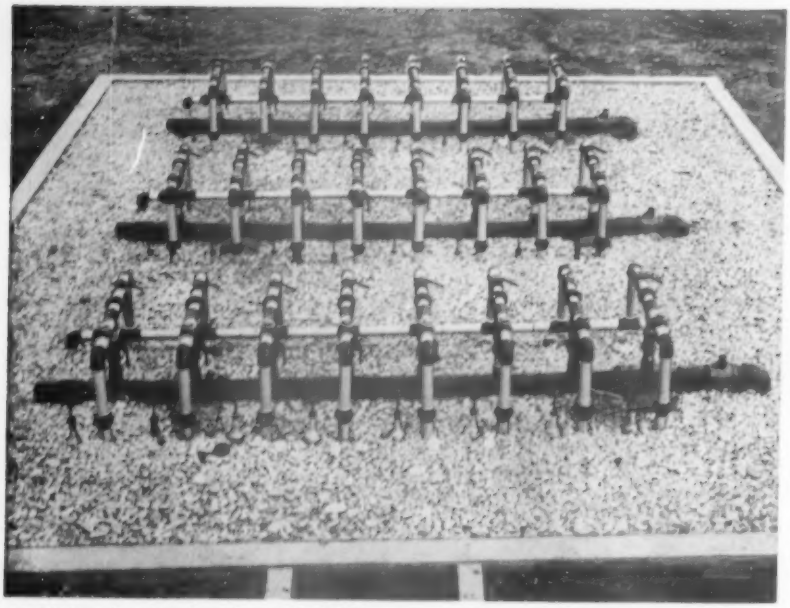

Unitizing Production from 24 Wells in water-flood operation. Production header equipped with 48 2-inch and 3 4-inch, fast-opening, Mudco Butterfly Valves. Critical shafts and set screws are Monel protected against salt water corrosion.

Improving reliability of equipment handling corrosive brines

Mudco uses Monel for critical parts of self-cleaning butterfly valves

In recent years, marked improvements have been made in the performance of equipment handling brines or combinations of brines and sour crudes.

One reason is the increasingly wide use of Monel® for critical parts. Monel is used, for example, for disc fastenings and shafts in the 51 self-cleaning Mudco Butterfly Valves employed in the production header shown above, to handle a mixture of crude oil and salt water.

In shafts and disc fastenings for this type valve, Monel provides an economical combination of corrosion resistance, machinability and strength.

Proves Essential In Many Areas

"In the oil country," says Mr. R. D. Baker, Manager of the Equipment Division of Mud Products, Inc. "Mudco O-ring Butterfly Valves are widely used in salt water disposal systems as well as water-flood operations. This service is particularly severe in a great many areas, and we have found that in order to accomplish satisfactory performance, Monel shafts and set screws (or bolts) are essential."

Improves Other Equipment, Too

Better performance has followed the use of Monel in many types of equipment exposed to brines and sour crudes. Monel is used, for instance, in barrels and internal parts of mechanical bottom-hole pumps, in well-survey instruments, in polished rods and in routing valves. In electrical bottom-hole pumps, "K"® Monel provides an extra measure of strength.

Monel has successfully overcome the added complications of salt-laden atmospheres and mechanical abuse in marsh buggies, sheathing for offshore structures, and cable and cable armor.

Do You Have Corrosion Problems?

If so, you can get objective assistance in finding causes and developing economical answers by contacting Inco's Corrosion Engineering Section.

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ELECTRIC LOGGING—35

A Special Case: The Limestone Device

by R. I. Martin

BECAUSE of the undesirable features of the standard devices, a special device was developed, known as the limestone device.

Four pickup electrodes are used, shown as M, N, M′, N′, in the lower part of Fig. 2. M and M′ are connected together, and so are N and N′. A current electrode A is placed at the midpoint of MM′, so that the electrode configuration is NMAM′N′.

This arrangement will behave as a symmetrical arrangement of two three-electrode devices, and the point of measurement is the center, A.

To make an explanation easier, the reciprocal arrangement ABMB′A′ will be considered first. This is shown in location (1) in Fig. 1. In this position opposite the dense part of the rock, the flow of current is between A and B and between A′ and B′. In this case, no current flows from B or B′ to infinity and these electrodes are at zero potential. Since A and A′ are connected electrically they are at the same potential. No current flows between them so that M is at the same potential as A and A′.

The potential at M depends on the potential difference between A and B, or between A′ and B′, which is independent of bed thickness but depends only on hole diameter and mud resistivity.

If then, there are no conductive zones so that the rock is homogeneous, the potential measured is not dependent on the position of the device, so that the apparent resistivity is constant throughout the bed.

The potential at M is given by:

$$V_M = Rm\ (AB/S)\ (I/2)$$

If it is supposed that the device is near a conductive layer, a part of the current from AA′ escapes and the potential at M decreases accordingly.

In order to study this case it will be easier to consider the original electrode arrangement NMAM′N′ shown at location (2) in Fig. 1. If the device is situated above the conductive streak, a part of the current is taken by the streak. The current density at the measuring electrodes does not start to decrease until the lowest electrode reaches the top boundary of the streak.

The apparent resistivity then continues to decrease until A becomes opposite the streak. While electrode A remains opposite the bed, a minimum resistivity is recorded. As the device is lowered still further a reverse sequence of events takes place.

The resulting curve is symmetrical with respect to the center of the conductive bed and its width is equal to e + NN′, with e being the conductive bed thickness.

When the device is located below the middle of the resistive bed, and above the conductive bed as shown at location (2) Fig. 1, it is obvious that the greater the resistance between A and Q, the greater the amount of current escaping through the conductive bed. Corresponding conditions will prevail for conductive beds above the center of the resistive bed.

Consequently, for a streak of given resistivity and thickness, the depth of the depression increases with the distance of the streak from the nearest boundary. The maximum depth is attained when the conductive layer is located at the center of the resistive bed. In other words, the leak has its greatest effect when at the middle of the bed. Calculations and experiments have been made to confirm the truth of this reasoning.

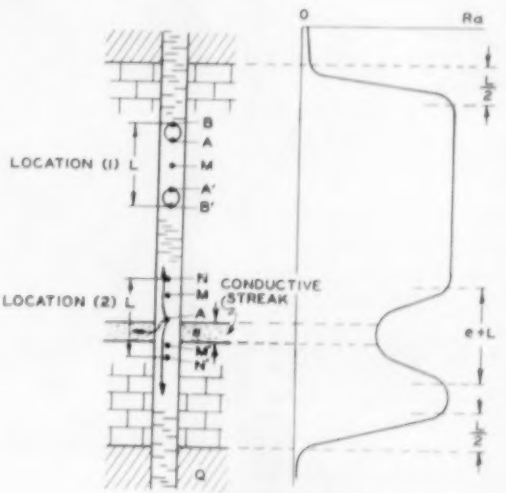

Fig. 1—Limestone device

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

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Drilling Contractors

Conroe Well Service Co., Houston, is starting another test for Sohio Petroleum Co. in the Quinn area, Liberty County, Texas Gulf Coast. The test, 2 Baldwin, is a semiwildcat slightly more than a half mile from Sohio's initial test, completed as a gasser. Contract is for 7,500 ft.

Rowan Drilling Co., Houston, has a contract with California Co. for a projected 13,500-ft. test at a wildcat location 2½ miles east of Venice field, in the Mississippi delta area, Plaquemines Parish, Louisiana. The test, in 28-21s-31e, is designated as 1 Louisiana Fruit Co. 5.

Mallard Well Service Co., Lafayette, La., will drill a 4,500-ft. wildcat test near Otis, in western Rapides Parish, Central Louisiana. Contract is for Harvey Schmidt at 1 Ervine, in 25-3n-4w.

Premier Well Service, Inc., Houston, has taken a contract for a 6,500-ft. test to be drilled for S. E. Brown, trustee, and others at a wildcat location east of Conroe, Montgomery County, Texas Gulf Coast. Location, at 1 Etheridge, in the John Toops Survey, is about 3 miles northwest of Conroe field, and about the same distance northeast of the active Conroe townsite area, where the contractor has been busy.

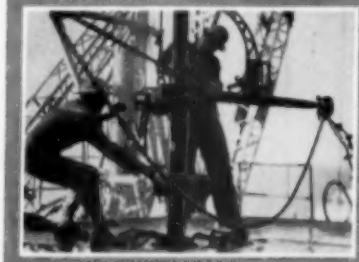
Cimarron Drilling Co., Tulsa, is scheduled for a 5,600-ft. wildcat test to be drilled for Frank G. Weimer and John FitzHugh at 1 Baker, in 13-22n-3w, about 1¾ miles northeast of Southeast Duff field, in eastern Garfield County, western Oklahoma. Leases were assembled by Parker Drilling Co., Tulsa.

Whitehurst Drilling Co., Shreveport, is moving a rig to a wildcat location near Powhatan, in northern Natchitoches Parish, North Louisiana, where it will drill for Lee Whitehurst, one of the owners of the contracting company, and Carl L. Bryan, also of Shreveport. The test, listed as 1 Walker et al., with location in 23-10n-8w, is projected to 4,000 ft.

Glenn Drilling Co., Tulsa, will drill another Travis Peak test for Union Producing Co. in Rodessa field, Caddo Parish, Louisiana. It will be 2-B Caddo Levee Board, located more than ¼ mile north of the company's first test, recently completed as the discovery well of that deeper pay zone, found slightly

Bankhead Drilling Co. was contractor on Atlantic Refining Co.'s newly completed gas-condensate discovery well, 1 Barber, 5 miles northeast of Aransas Pass, in Aransas County, lower Texas Gulf Coast. Shown at the well are (top row, left to right): Buddy Hebert, Mission Manufacturing Co.; R. H. Richerson, driller; J. N. Cox, floorman; Guy Harrell, tool pusher; H. M. Tankersley, drilling engineer; and (bottom row, same order) C. A. Kucera, motorman; S. T. Goggans, floorman; and R. L. Billings, derrickman. The well was drilled to 10,000 ft., and produces from perforations at 7,014-36 ft. New field has been designated as East Aransas Pass.

CUT *shop expense*



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below 6,800 ft. The new test is contracted to 7,000 ft. **Wheless Drilling Co.,** Shreveport, also has a rig in the same area, where it is drilling a Travis Peak test for Arkansas Louisiana Gas Co. at 2 Parker, about ¼ mile southeast of Union's new test.

Symonds Drilling Co., Houston, is drilling on a new deep test for H. M. Naylor Oil Co. in Thompsons field, Fort Bend County, Texas Gulf Coast. The test is 5-B Gehr. Contract depth is 9,000 ft.

Gist Drilling Co. has a new wildcat operation under contract for Chicago Corp. and Republic Natural Gas Co. It is 1 Butterwick-Government, located on the Alkali Creek structure, 5 miles north of Hiawatha, in Sweetwater County, Wyoming.

New Drilling Co., Denver, is drilling on another wildcat test, 1 Tompkins, in Logan County, Colorado. Location is 1½ miles east of Bonham field, in 25-8n-55w. The contractor is a joint operator with Lee Swedlund.

Atlantic Drilling Co., Los Angeles, has a rig working for Aeco Corp. on a projected 7,500-ft. test in the Northeast White Rock area in Cuyama Valley. Location is in 13-11-28, near the Santa Barbara-San Luis Obispo county line.

Vasser & Brown, Natchez, Miss., will drill Crosby Lumber & Manufacturing Co.'s projected Wilcox test in Darrington field, Wilkinson County, southwestern Mississippi. The test is listed as 1 Crosby-Young. Contract is for 7,500 ft.

Crow Drilling Co., Inc., Shreveport, is contractor and joint operator with I. P. LaRue and G. G. Stanford on a Lower Cretaceous test being started about 1¾ miles south of Berndale, in George County, southern Missisippi. The test, 1 Dantzler, in 29-2s-8w, is expected to be carried to 8,750 ft.

Casey & Montgomery will drill an extension test in the North Fruitvale area, near Bakersfield, Kern County, California. It is a contract job for King Petroleum Co., a newcomer to Kern County. Location is for 1 Owens, in 11-29-27.

Falcon Seaboard Drilling Co., Tulsa, has a rig working on a rank wildcat test in El Paso County, Colorado. The test, being drilled for Milton Petterson, is projected to around 6,800 ft. for a look at the Permian-Lyons formation. Location, in 23-14s-65w, is about 9 miles east of Colorado Springs.

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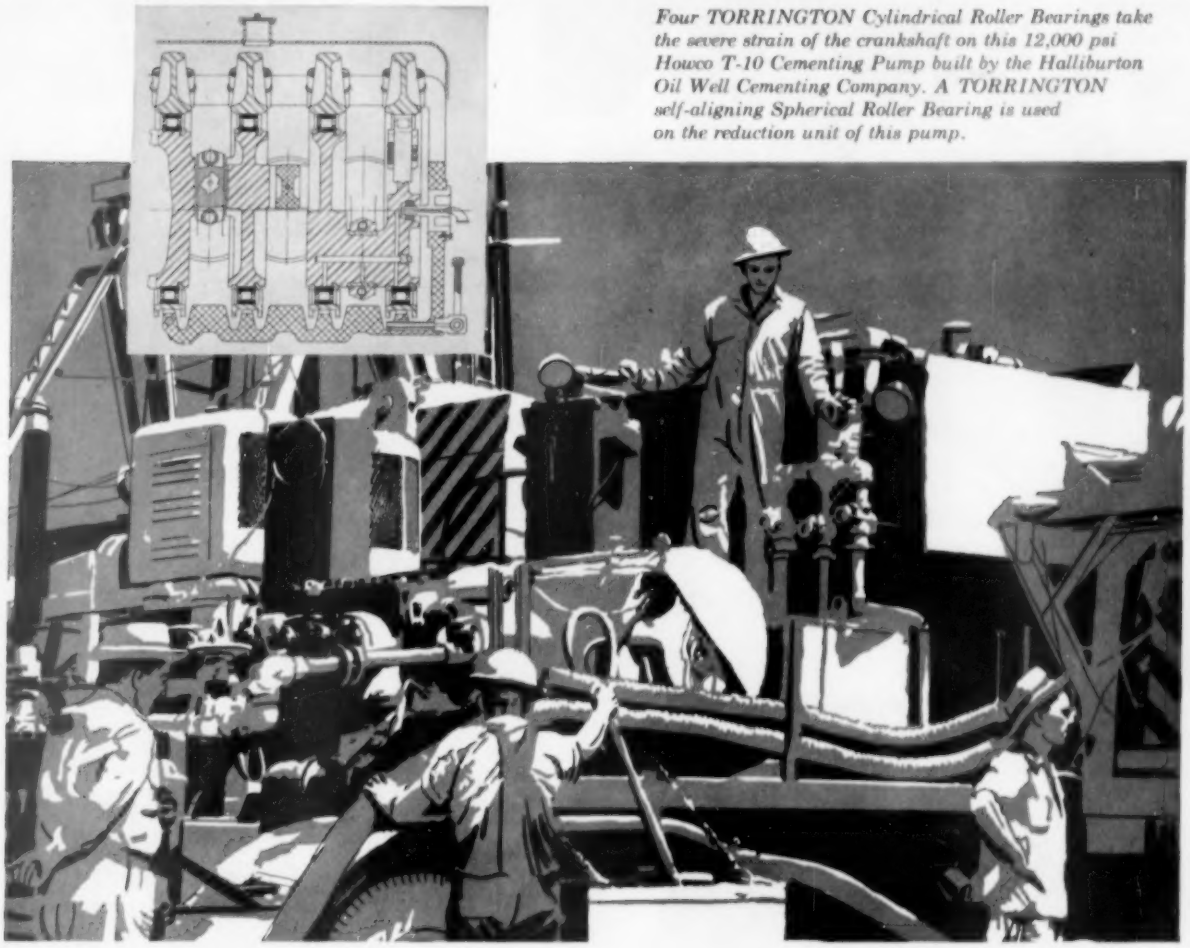

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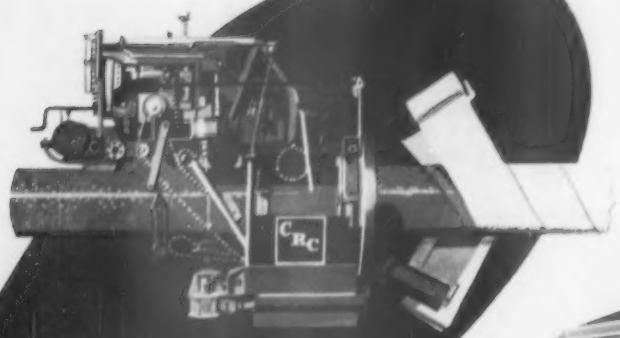

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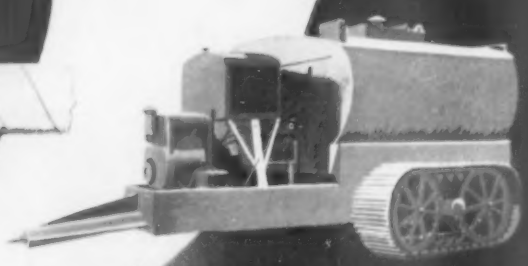

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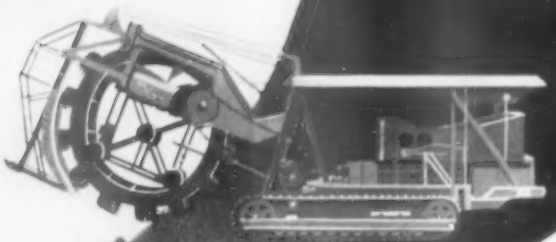
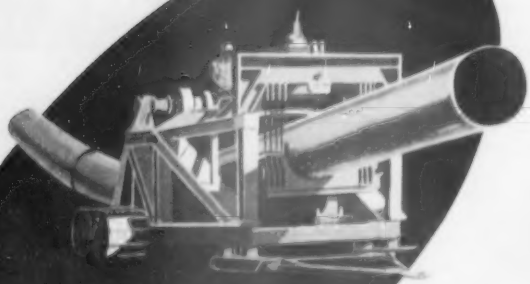


C-R-C DITCHING MACHINES — MIDDLE INCHER AND BIG INCHER — DITCH TO 52" WIDE WITH A DEPTH CUT OF 8'6".



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Pipeline Patrol

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CUTTING and double-beveling of heavy-wall pipe by a combination saw and milling machine on the pipeline right-of-way is possible with the machine pictured here. Double beveling of the heavy-wall pipe eliminates the necessity for machined transition rings which are normally welded on the end of heavy sections where joints are made to thinner-walled pipe.

In the operations shown the air-powered machine is being used to cut the test plug from a section after hydrostatic testing; it was then used to bevel both the inside and outside of the end of the heavy section, preparing it for welding to the thin-wall section. The machine was used during construction of the Gulf Interstate Gas Co. 30-in. line.

Under Way, Contracted, and Planned . . .

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the job.

Crude-Oil Pipelines

• **California - Oregon Pipe Line System**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

Interstate Oil Pipe Line Co.—River Construction Co. has contract to build 25 miles of 8 and 12-in. line from Little Lake oil field in Jefferson Parish, La., to Grand Isle on the Gulf of Mexico. Completion set for September 1.

Minnesota Pipe Co.—Williams Brothers Co. has contract to build this 260-mile, 16-in. crude line from Clearbrook to Hastings, Minn. The line, to cost $12,500,000 is the southern end of a system which will move crude from Fosterton field, Sask., to Great Northern's refinery which is building in the Minneapolis-St. Paul area. Present plans call for completion by July 1955.

• **NNCW Pipeline Co.**—127-mile line, proposed, from Weston County, Wyoming to Casper. 108 miles of 10-in. and 19 miles of 8-in. Est. Cost: $3,500,000.

• **Orchard Pipe Line Co.**—45-miles, 8-in., proposed to transport crude from Masters field in Logan County, Colorado, to point

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(WRITE FOR CATALOG)

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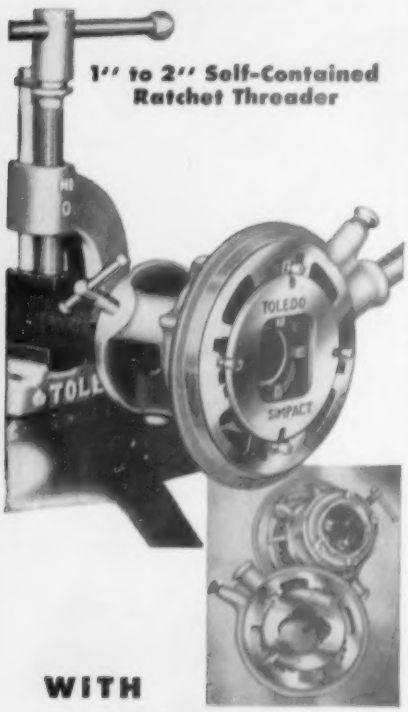

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Pipeline Patrol

4 miles northwest of Orchard. Estimated cost: $811,250.

• **Pawnee Pipe Line Co.**—35 miles of 10, 8, and 6-in. line approved from Adena field in Colorado to Merino, Colo.

Shell Pipe Line Corp.—Houston Contracting Co. has contract to build 72 miles of 8-in. line from Hallettsville to Brookshire, Tex. Job includes crossings of Brazos and Colorado Rivers. H. J. Muckley is superintendent, H. L. Leake is spread superintendent.

Arapahoe Pipe Line Co.—This company, owned jointly by Sinclair and Pure, is expected to start work this summer on a 494-mile crude line from Merino, Colo., to Humboldt, Kan., where it will connect with Sinclair's system now carrying crude to Chicago and St. Louis. The system will have an initial capacity of 80,000-bbl. daily. The 319-mile section from Merino to Great Bend, Kans., will be of 18-in. pipe while the 175-mile stretch from Great Bend to Humboldt will be 20-in.

Trans Mountain Oil Pipe Line Co.—Company has awarded contract to Engineers Limited Pipeline Co. to build 15 miles of 20-in. and 11 miles of 16-in. line. Both lines run from Sumas, B. C., to General Petroleum's refinery which is being built at Ferndale, Wash. Completion set for September 1954.

• **Union Oil Co. of California.**—Planning construction of a 60-mile crude line from its Clara Valley field to its Wilmington refinery. Line is expected to be completed by late this year. Size not yet determined. Engineering work under way.

Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area.

Badger Pipe Line Co.—Company to build 195 miles of 8-10-12-in. pipeline from East Chicago, Ind., to Madison, Wis. One section of 40 miles has been let to Morrison Construction Co. of Hammond, Ind. Rest of the work is expected to be let in August as pipe has already been yard-coated. (Joint project of Cities Service Oil Co., Sinclair Pipe Line Co., Pure Oil Co. and The Texas Co).

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-8-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Great Lakes Pipe Line Co.—Company began a 714-mile expansion program at the beginning of Spring. First section of the program, 182-mile, 8-in., from Nebraska City to Doniphan, Neb., is finished. The remainder of the work is divided as follows:

127 miles, 8-in. from Iowa City, Iowa, to Prophetstown, Ill., to tie in with the Badger system there. M. R. Co. and Mid-States Construction Co. have the job.

188 miles of 12-in. from Kansas City to Des Moines. Midwestern Constructors, Inc., has 48 miles, R. H. Fulton & Co. 71 miles, and M. R. Co. has 69 miles.

83 miles of 12-in. between Alexandria and Rosendale, Minn., being done by Associated Pipe Line Contractors, Inc.

80 miles of 12-in. between Rosendale and Rosemount, Minn., being done by R. H. Fulton & Co.

105 miles of 8-in. from Alexandria to Fargo, N. D., being done by R. H. Fulton & Co.

Harbor Products System.—86 miles of 16-in. underway from Woodbury Junction to Tremley Point, N. J. Pipeline Construction & Drilling Co. is doing the work and completion is not definite because of right-of-way difficulties.

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Pipeline Patrol

• **International Pipe Line, Inc.**—132 miles, 8-in., proposed. Wrenshall to Minneapolis, Minn. Cost: $4,200,000.

Oil Basin Pipe Line Co.—Midwestern Constructors, Inc., doing the work on this 230 miles of 8-in. products line from Laurel to Glendive, Mont. Tentative completion date set for September 15. Cost: $5,350,000.

Phillips Pipe Line Co.—71 miles of 8-in. now out for bids. Company expects line to be completed in September. Job is between St. Louis and Chicago.

Shell Pipe Line Corp.—65 miles of 12-in. products line from Baton Rouge, La., to Shell's Norco refinery. Houston Contracting Co. has contract. H. T. Muckley, Supt. Job held up indefinitely by right-of-way difficulties.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport LPG from six counties in western Kansas to Wichita.

U. S. Gov't. Alaskan Products Pipe Line.—600 miles, 8-in., under way, Haines northward through British Columbia and Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Const. Co. Completion date 9-55. 200 miles completed July 15.

Wyoming-Nebraska Pipeline Co.—Houston Contracting Co. has general contract to build 220 miles of 6-in. line from Frontier Oil Co.'s refinery at Cheyenne to North Platte, Nebraska. Work expected to be completed by October 1954.

Yellowstone Pipe Line Co.—(Continental Oil Co., Interstate Oil Pipe Line Co., Union Oil Co., and H. Earl Clack interest) 531 miles, 10-in., under way, Billings, Mont., to Spokane, Wash. 9-54. Est. cost: $20,500,000.

Billings to Bozeman, Mont. Ross and Powers. Comp. 133 miles, 8-31-54.

Bozeman to Helena and on to Clinton, Mont. Associated Pipe Line Contractors, Inc. Completed. 94 miles 6-15-54.

Helena to Clinton Mont. Associated Pipe Line Contractors, Inc. 69 miles 8-31-54.

Clinton to Perma, Mont. Eastern Pipe Line Fields Service Co. 76 miles. Completed.

Perma, Mont., to Murray, Idaho. Eastern Pipe Line Field Service Co. 74 miles 7-1-54.

Murray, Idaho to Spokane, Wash. Engra Limited Pipe Line Co. 85 miles 7-1-54.

Natural-Gas Pipelines

• **American-Louisiana Pipe Line Co.**—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Louisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich. Estimated cost: $130,000,000.

• **Arkansas Louisiana Gas Co.**—108 miles of new line proposed, to be added to present system in Arkansas, Louisiana, and Texas. Estimated cost: $9,245,166.

• **Atlantic Seaboard and Virginia Gas Transmission.**—116 miles, 26-in., proposed, loops along Cobb, W. Va., to near Baltimore, Md. Started May 1.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

Chicago District Pipe Line Co.—19 miles of 36 and 30-in., completed of 35 miles planned. Remainder, all 30-in., will be completed in 1954.

• **Cities Service Gas Co.**—24 miles of 26-in. planned, to replace two existing 16-in. lines in Franklin and Johnson counties, Kansas. F.P.C. approved.

Nine miles of 20-in. to replace existing 16-in. line in Cherokee and Jasper counties, Missouri. F.P.C. approved.

• **City of Dalton, Ga.**—Proposes to build 39 miles of 8-in. from a point of interconnection with Southern Natural's Rome-Calhoun transmission line. Estimated cost: $2,940,000.

• **City of Fayette, Ala.**—20 miles, 5-in., FPC approved, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Alabama. Completion set for early 1955.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., approved by F.P.C., Green River, Wyo., to Denver, Colo., 1954.

• **Colorado-Western Pipe Line Co.**—454 miles of undetermined size pipe planned between Cortez in Montezuma County and Denver. Line would serve towns of Montrose, Gunnison, Salida, Fairplay and South Platte, Colo. Estimated cost: $30,000,000. Company also plans 254 miles of laterals to service Colorado cities not now receiving natural gas.

328-mile line, proposed, to run from a point in La Plata County in southwestern Colorado over the Continental Divide along the eastern slope to serve Pueblo, Colorado Springs, and Denver. Estimated cost: $21,600,000.

• **Fort Worth Basin Gas Co.**—Planned Novice, through Brown and Comanche counties, Texas.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Gulf Interstate Gas Co.—Company is winding up 860-mile, 30-in. job from Acadia Parish, La., to Boyd County, Kentucky.

Houston Contracting Co. has 20 miles remaining of 500 miles and expects to finish by the first of August.

H. C. Price Co. has 70 miles remaining of its original 346-mile contract. No exact finish date has been announced as yet.

• **Home Gas Co.**—Asking for bids on 24 miles of 12-in. from Halsey Valley to Westover, N. Y.

Also asking for bids on 25 miles of 12-in. from Port Dickinson to Deposit, N. Y.

• **Hope Natural Gas Co.**—Proposing to build a 22½-mile extension of existing line from Boone County, West Virginia, to Logan-Mingo County Line, W. Va. Est. Cost: $930,000.

• **Houston Texas Gas & Oil Co.**—Company proposes to build two natural gas lines. One line would run from lower Rio Grande Valley to Chicago. The other line would go from southern Louisiana to New York City. Engineering firm reported preparing an economic report on the lines at present.

• **Iroquois Gas Corp. and Tennessee Gas Transmission Co.**—Companies planning joint storage project to be known as Colden storage field in New York. The following delivery and gathering lines are planned:

17 miles, 16-in. delivery line.

62 miles, 12, 8, 6, and 4-in. gathering lines.

• **Iroquois Gas Corp.**—25 miles of 20-in. line, approved by FPC, from Iroquois' Porterville station near Elma, N. Y., to Tonawanda, N. Y. Est. cost: $1,540,000.

• **Kansas-Nebraska Natural Gas Co., Inc.**—Proposes to construct 206 miles of 6-12-in. pipeline to add to present system in central and northeastern Nebraska.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various

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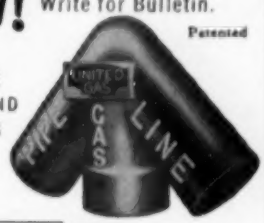

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points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., proposed, Doddridge, Wetzel and Marshall counties, West Virginia.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Wisconsin.

Mid-South Gas Co.—Engineering Construction Co. of Tulsa has contract for 50 miles of various size pipe from Marion to Truman, Ark.

• **Missouri Central Gas Co.**—25 miles, 6-in., proposed, Moberly to Macon, Mo.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo. FPC approved. Est. cost: $600,000.

• **Montana-Dakota Utilities Co.**—Proposes to build 56 miles of 2, 4, and 6-in. line from its 12-in. Cabin Creek-Bismarck line near Gladstone, N. D., to the towns of Lefor, Regent, New England, and Mott, N. D.

• Proposed 34½ miles of 12¾-in. line to run from Baker-Glendive field in Montana to Rapid City, S. D., and 14 miles of 12¾-in. to replace various lines in Park County, Wyoming, and Carbon County, Montana.

• **Natural Gas Producer, Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **North Dakota Gas Transmission Co.**—470-mile line from Tioga plant of Signal Oil & Gas Co. and Beaver Lodge field to Fargo and Grand Forks, N. D. Line will have 78 miles of 12-in., 215 miles of 10-in., 70 miles of 8-in., and 107 miles of 6-in. Estimated cost: $10,800,000.

• **Northern Indiana Fuel & Light Co.**—15 miles, 8-in., planned, Edgerton to Auburn, Ind.

Northern Natural Gas Co.—Midwestern Constructors has finished one job for this company consisting of 5 loops of 94.3 miles of 30-in. line in Texas, Oklahoma, and Kansas. Another job consisting of 6 loops, 94.9 miles of 30-in. line in Kansas, Nebraska, Iowa, and Minnesota is 75 per cent completed as of July 20.

93½ miles of 20-in. from Ogden to Waterloo, Iowa, being done by Hallmac Construction Co. of Houston.

90 miles of 16-in. from Waterloo to Dubuque, Iowa, being done by Engineering Construction Co. of Tulsa.

54 miles of 16 and 10-in. from Newton to Grinnell, Iowa, has been finished by G. G. Griffis Const. Co. of Tulsa.

24 and 26-in. lines south of Paullina, Iowa, and 20 and 24-in. lines from Paullina to Sioux City being done by R. H. Fulton Co.

Two underwater crossings totalling 5,100 ft. being done by Lone Star Constructors of Dallas.

G. G. Griffis also has 118 miles of 2-12-in. between Rochester and Redwing, Minn., for Northern Natural.

• **Northwest Alabama Gas District**—40 miles, 9-in., proposed, Southern Natural's line through Windfield to Haleyville, Ala.

• **Northwest Natural Gas Co.**—665 miles of unannounced size pipe to bring gas from Alberta, Canada, to the "Inland Empire" of northern Idaho and eastern Washington. Estimated cost: $36,000,000.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

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23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in Lawrence, Jackson, Vinton, Hocking and Fairfield counties, Ohio.

• 24½ miles of 20-in. line in Richland and Crawford counties, Ohio.

Pacific Gas & Electric Co.—200 miles, 34-in., planned, paralleling Topock-Milpitas line. 93 miles completed. 107 miles contracted to Engineers Limited Pipe Line Co. L. E. Robertson is in charge of the spread handling work from Newberry to Danby and from Los Muertos Creek to Gilroy, Calif. Completion November 1954.

15 miles, 20-in., planned for completion in 1955 from Helm Tap to Helm Junction, Calif. Alex Robertson Co.

15 miles, 12-in., planned for completion in 1955. From Herndon to Madera, Calif. Company forces.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash. Approved by F.P.C.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

• **Shenandoah Gas Co.**—40 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va. Est. cost: $1,470,000. FPC approved.

• **South Georgia Natural Gas Co.**—368 miles, 2-12-in., planned, Phoenix, Ala., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee. Est. Cost: $9,000,000.

• **Southeast Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co.

Tennessee Gas Transmission Co.—Company has awarded following contracts on 566.8 miles of 30-in. line from Kinder, La., to Portland, Tenn.

98.7 miles from Kiner to U. S. Highway 84 near Jena, La., to Morrison Constructors, Inc.

90.2 miles from U. S. Highway 84 to Louisiana side of Mississippi River to Anderson Brothers Corp.

105 miles from Mississippi River to U. S. Highway 51 near Grenada, Miss., to Houston Contracting Co.

101.6 miles from Grenada to U. S. Highway 45 near Corinth, Miss., to Oklahoma Pipe Line Constructors.

94.9 miles from U. S. Highway 45 to near Centerville, Tenn., to Western Pipe Line Constructors, Inc.

75.6 miles from Centerville to near Portland, Tenn., to Panama-Williams Co.

63 miles, 26-in., under way, loops in Ohio and Pennsylvania. H. C. Price Co.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U.S.-Canadian border near St. Catherines.

243 miles 24-in., planned, Coudersport, Pa., eastward across Pennsylvania, New Jersey, and New York to point near Greenwich, Conn.

• **Texas Eastern Transmission Corp.**—Proposed, 225-mile, 30-in. line from Castor, La., to Kosciusko, Miss., to connect with its existing 30-in. line there to Connellsville and replace the "Little Inch" in moving natural gas.

• Company proposes to build 58 miles of 20 and 16-in. pipeline from Joaquin to Longview, Tex. Company has filed an application with the Federal Power Commission. Cost: $3,269,000.

Texas Eastern Penn-Jersey Transmission Corp.—265 miles, 24-in., approved by the FPC from Oakford Storage field in western Pennsylvania to Texas Eastern Transmission Corp.'s Compressor Station No. 26 near Lambertville, N. J. Est. cost: $30,755,000. 54 miles let to H. C. Price Co. C. E. Shivel, superintendent.

• **Texas Gas Transmission Corp.**—48 miles, 26-in., planned, loops from Memphis to Slaughters, Ky.

24 miles, 16-in. line planned from North Tepetate field, Acadia Parish, Louisiana, to South Roanoke field in Jefferson Davis Parish, Louisiana. Work to be done in September and October.

• **Transcontinental Gas Pipe Line Corp.**—421 miles, 30-36-in., looping along Texas-New York line.

• 19 miles of 12.75-in. pipe starting at West White Lake field in Vermilion Parish, Louisiana, and connecting with applicant's transmission line in same parish. Estimated cost: $1,042,310. FPC approval received.

• 57 miles of 36 and 30-in. paralleling sections of its existing system in Louisiana, Mississippi, and Alabama. Approved by FPC. Est. cost: $6,533,000.

• 25 miles of 12-in. in Cameron and Calcasieu parishes, Louisiana, to additional gas reserves. Est. cost: $1,000,000.

• **Trans-Northwest Gas, Inc.**—246 miles, proposed, International Boundary near Osoyoos, B. C., to Washington and Idaho.

275 miles, branch lines.

• **Trunkline Gas Co.**—Proposes to cross the Mississippi River with two 24-in. lines near Greenville, Miss. Est. cost: $2,960,000.

• **United Fuel Gas Co.**—52 miles, 20-24-in., proposed, Wood County to Lanham, W. Va. Spring 1954.

57 miles, 30-in., under way, Lanham in Kanawha County, West Virginia, to Gulf Interstate line in Boyd County, Kentucky. Spring '54. C. R. Ice, spreadman.

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not let yet.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Foreign Crude-Oil Pipelines

• **Atlas-Dresser.**—Included in this company's agreement with the Argentine Government are plans to built a 400-mile, 16-in. crude line from Plaza Huincul area to Bahia Blanca.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products). Collins Const. Co. has subbed 84,000 ft. of Subaqueous work. Shutdown for Monsoon season. Work will resume September 15.

Creole Petroleum Corp.—21 miles, 34-in. crude line to run from Lagunillas field to La Salina, Venezuela. Williams Brothers Overseas Co. has contract with construction slated to start in February and to be completed in 6 months. Line when completed will be the world's largest-diameter crude line.

Direccion General de Yacimientos Petroliferos Fiscales—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

• **Gaz de France**—200 miles, 12-in. Ruhr to Paris, France.

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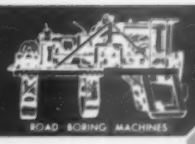
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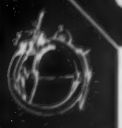
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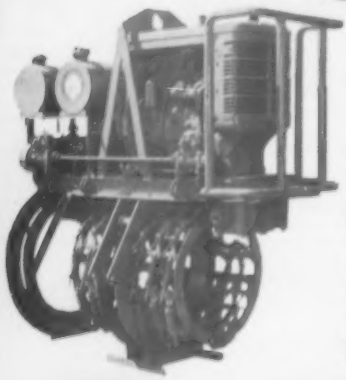

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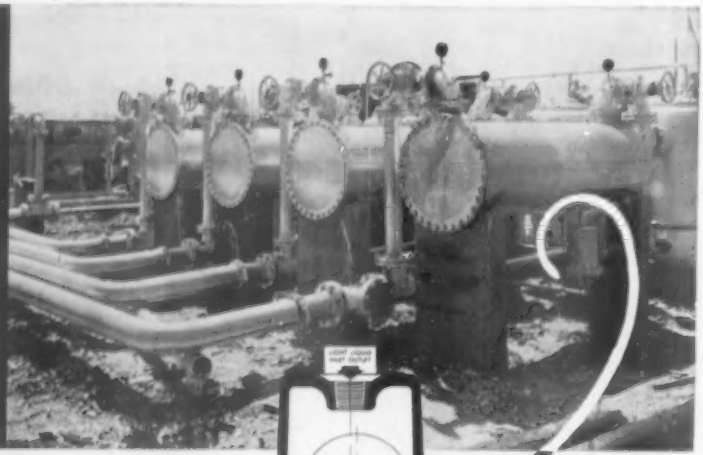

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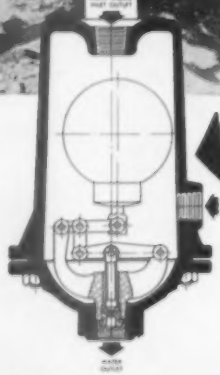

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Interprovincial Pipe Line Co. and Lakehead Pipe Line Co.—Contracts have been awarded for 604 miles of looping; 454 miles will be in Canada, the remaining 150 miles will be in the United States.

201 miles of 24-in. between Regina and Gretna, Man., have been awarded to Anderson International Contractors, Ltd., of Edmonton, Alta.

Mannix, Ltd., of Calgary, Alta., will lay 129 miles of 24-in. line between Edmonton and the Alberta-Saskatchewan boundary.

Fulton-Bannister, Ltd., has contract for 125 miles of 24-in. line to connect the lines being built by Anderson and Mannix.

R. H. Fulton & Co., of Lubbock, Tex., has the contract for 104 miles of 26-in. looping from the Canadian border southeast. Anderson Bros. Corp. has contract for 50 miles of 26-in.

South Saskatchewan Pipe Lines, Ltd.—Fulton-Banister, Ltd. has contract to construct 155 miles of 16-in. crude line from Fosterton field in Saskatchewan to a connection with Interprovincial Pipe Line Co.'s system at Kerrobert station near Regina. Line will have a capacity of 20,000-bbl. per day, will cost $10,000,000 and is expected to be finished by November.

• **Pembina Pipe Line Co., Ltd.**—Company has permit to build 325 miles of 3-12-in. gathering line from Pembina field and a 72-mile, 16-in. transmission line to the terminals of Trans Mountain Pipe Line Co. and Interprovincial Pipe Line Co. at Edmonton, Alta.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Ishthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

Petroleos Mexicanos.—125 miles, 10-in., under way, Jose Colomo to El Plan, Mexico.

Texas Petroleum Co.—Contract has been let to Foster Wheeler Corp. and Panama-Williams for a 119-mile 12-in. crude line to move oil from Velasquez field in Colombia to a connection with the main Andian National system at Galan. Est. cost: $6,000,000.

• **Yacimientos Petrolifferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipelines

Anglo-Iranian Oil Co., Ltd.—18½ miles, 16-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

18½ miles, 6-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

15 miles, 12-in., under way, Kwinana to Fremantle, M. W. Kellogg Co. Completion date February 1955.

17 miles, 6-in., Kwinana to Fremantle. M. W. Kellogg Co. Completion date February 1955.

• **Empresa Nacional del Petroleo — 80** miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO)—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line.) Contracted by Soc. Foster Wheeler Francaise.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

• **United States Navy Department.**—Proposed 300-500-mile line to be built in Spain to serve a proposed naval base and four large air bases which are also proposed under a defense agreement with the Spanish Government. No definite size or cost is known now.

Foreign Natural-Gas Pipelines

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

Direccion General del Gas del Estado—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

• **Empresa Nacional del Petroleo — 80 miles,** 10-in., planned, Concon to Santiago, Chile.

Petroleos Mexicanos. — 205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.—440 miles,** 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

Sui Gas Transmission Co. Ltd.—Morrison-Knudsen Construction Co. has contract to build 350-mile, 16-in. line from Sui field to Karachi in West Pakistan. Est. cost: $25,000,000.

• **Trans-Canada Pipe Lines, Ltd., (Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in., gathering system in Alberta.

• **Union Gas Co. of Canada, Ltd.**—Proposed line from Lambton County gas-storage fields to Oakville. Line is being proposed now and will eventually join with proposed line from Alberta to Toronto and Montreal.

• **U. S. Navy**—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks. Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design estimated the line would cost $20,000,000, although later figures have been much higher than this.

• **Western Pipe Lines, Ltd.**—Will build 80-mile, 20-in. line from Niagara Falls, N. Y. to Toronto. Gas will be furnished by Tennessee Gas Transmission and taken over in Toronto by Consumers Gas Co. Est. cost: $7,000,000. Canadian Bechtel, Ltd., doing engineering work.

BOOKS

MONOMOLECULAR LAYERS. Edited by Harry Sobotka. Published by the American Association for the Advancement of Science, Washington, D. C., 1954. 207 pp.

This book is the product of a symposium presented on December 27, 1951, at the Philadelphia meeting of the A.A.A.S. Members of that symposium and other scientists were invited to contribute their thinking to a cross-section review of recent progress in monomolecular layers. This volume is that review. Essentially, it was designed to be a symposium that illustrates the scope and strength of the methods and techniques used by the leading scientists in monomolecular layers research. Its value lies in the diversity of thought it contains on a field of chemistry that still offers many challenging problems to research chemists.

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Internal combustion engines are stopped automatically on dangerously low oil pressure or high water temperature. Optional types of disconnect switches and mounting panels available.

Model W-275 features new MURPHY automatic lube oil disconnect switch. Pushbutton sets lockout. Normal lube oil pressure automatically resets switch when engine is started.

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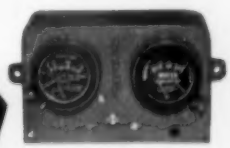
MODEL W-275-D



Slightly larger cast tenzaloy panel than W-275 to provide mounting space for No. 101-D instant snap switch which grounds two magnetos when safety switches operate.

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CROWN

Crown Central Petroleum Corporation is installing a new

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at its refinery near Houston, Texas. Rated at 5000 BPSD, the new unit will handle typical stocks processed in gulf coast refineries. Although designed primarily for up-grading motor gasoline, it will also produce aromatics and aviation blended stocks.

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REFINING

Expansion Finished

Tide Water on stream with new units at Avon

SAN FRANCISCO.—Tide Water Associated Oil Co. has completed an expansion program at its Avon, Calif., refinery and has placed the new facilities on stream.

The expansion, which was undertaken to increase gasoline, diesel fuel, and heating-oil production, provides additional feed-preparation capacity, improves existing thermal cracking facilities, and adds a new boiler unit.

By increasing the depth of the vacuum flashing of residual oils and extending these operations to cracked pitch with certain changes in processing, the company estimates that it will produce an additional 2,200,000 bbl. of gasoline and other products from low-grade fuel oil each year.

The new feed-preparation facilities include additional furnaces and vacuum distillation equipment with required accessories such as pumps, control instruments, and other auxiliaries.

Fluor Corp. was the contractor.

Lube Oil Exports Show Gain Over 1953 Figures

NEW YORK.—Lube oil exports have staged a sharp recovery this year, according to the latest figures compiled by National Petroleum Association. Total exports for the first 5 months of 1954 are 6,015,135 bbl., a 31 per cent increase over the 4,575,253 bbl. shipped abroad during the same period in 1953. These figures do not include greases.

Lube exports have been steadily declining during the past three years as European and other foreign refiners added substantially to producing capacity. The peak was reached in 1951, when 17,429,000 barrels were shipped. Last year the total had dropped to 13,015,000 bbl.

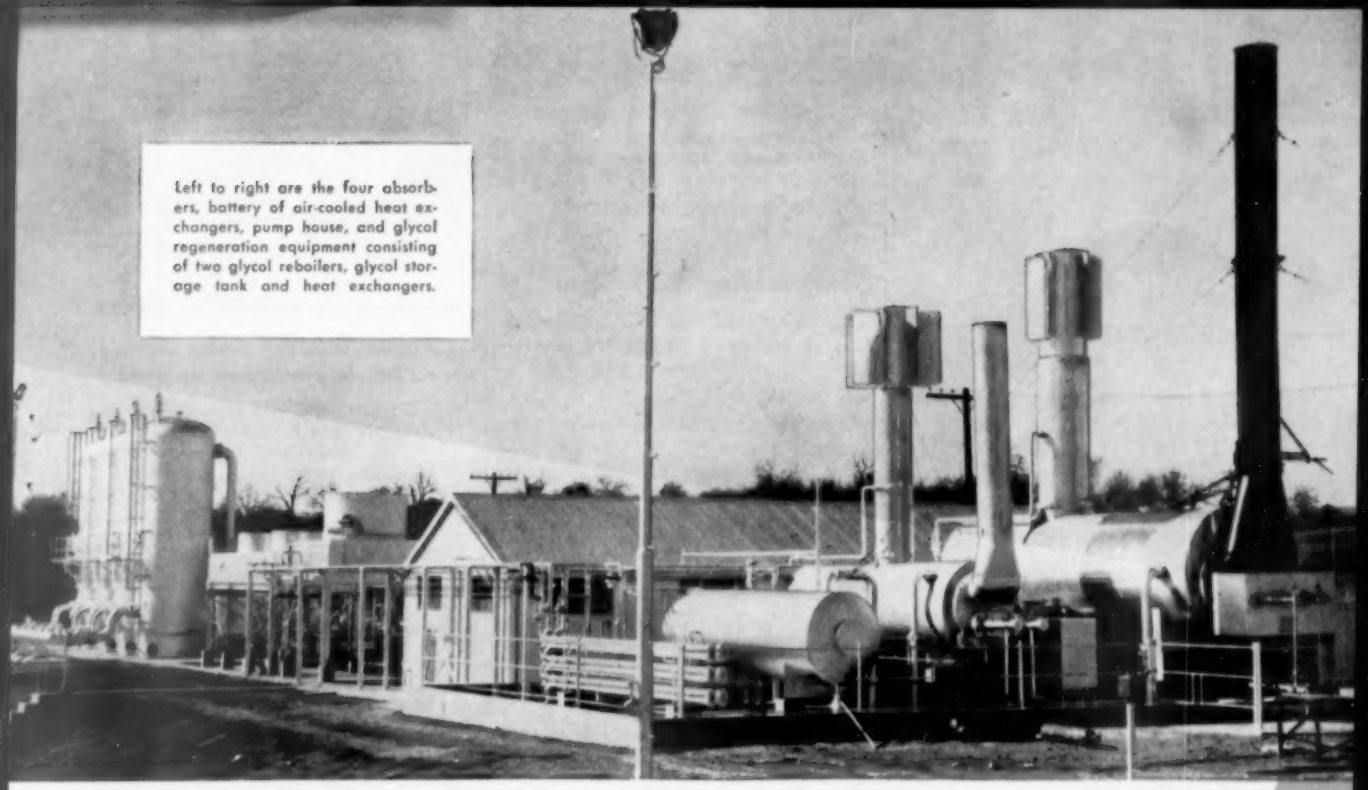
Coker Construction Begins

SANTA MARIA, Calif.—Construction is now under way on the 18,700-bbl. coking plant being built by Bechtel Corp. for Union Oil Co. at an ocean-front site 12 miles northwest of here.

The plant will be of the delayed cok-

Model Aids Esso's Fight Against Atmospheric Pollution

Esso Standard Oil Co. has erected this scale model of its Baltimore refinery in its fight against atmospheric pollution. The model, which simulates actual refinery conditions is set up in a low speed wind tunnel at New York University's College of Engineering. An oil fog is sent through the miniature stacks and the effect of various stack heights and other factors can be duplicated for widely varying weather conditions. Smoke density is deliberately exaggerated to facilitate plotting the plume and determining concentration of stack emissions at various points. A research scientist is shown adjusting the smokestack on the refinery's steam plant.



Left to right are the four absorbers, battery of air-cooled heat exchangers, pump house, and glycol regeneration equipment consisting of two glycol reboilers, glycol storage tank and heat exchangers.

560,000,000

SCF OF RESERVOIR GAS PER DAY...

...Can Be Dried In This BS&B Built Dehydration Plant At Depew, Oklahoma!

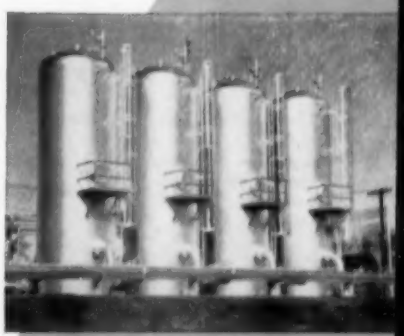
When Oklahoma Natural Gas Co. wanted to double the capacity of their Dehydration Plant serving their 57 billion cubic foot underground gas reservoir near Depew, Oklahoma, they called in BS&B — designers and builders of the original plant.

The job was accomplished within a few months by the addition of two new absorbers, and by doubling the capacity of the cooling system and the glycol reactivation equipment. At the same time, provision was made for additional plant expansion when the need arises.

Present capacity of the plant is 560,000,000 SCF/D at 800 psi pressure. During one month when 4,600,000,000 cubic feet of gas was withdrawn from the reservoir and processed through the new plant, the amount of moisture removed from the gas was equivalent to 20,000 gallons of water!

If you have a dehydration problem —at the well head, at a field processing installation or along the pipeline—why not take advantage of BS&B's many years of successful experience in solving it? Your BS&B Representative will be glad to discuss it with you . . . or you may write

OIL & GAS EQUIPMENT DIVISION, DEPT. 1-A8



Close-up of the four absorbers where the moisture-laden gas gives up its water vapor to a circulating solution of lean triethylene glycol. They are 21 feet high and 8 feet in diameter.

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ing type and will have two parallel coking drums. Completion of the $14,000,000 project, which includes a 42-ton daily capacity sulfur plant, is scheduled for March of next year.

Houdriformer Work Begun

CATLETTSBURG, Ky.—Construction has started on a 6,000-bbl. Houdriformer at the Ashland Oil & Refining Co. refinery here.

Catalytic Construction Co. has been awarded the contract to design and construct the new unit. The cat reformer is scheduled to be placed on stream next summer.

Plant May Expand

Missouri company eying diversified product list

LOUISIANA, Mo.—Hercules Powder Co., which late last month started producing anhydrous ammonia at its Missouri Ammonia Works here, is studying the possibilities of making methanol, formaldehyde, and pentaerythritol at the reopened plant.

One ammonia line is in operation and the remaining two will be placed on stream within a few weeks.

Dr. Wyly M. Billing, general manager of the Hercules synthetics department, said one of the ammonia lines easily could be converted to methanol production. He said the works also has the buildings and service facilities to house a pentaerythritol and formaldehyde plant of "substantial capacity."

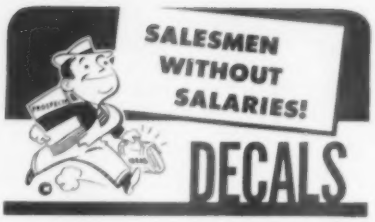
The plant formerly was the Missouri Ordnance Works. It is owned by the Government, but Hercules recently leased the plant with an option to buy *(The Oil and Gas Journal, April 26, page 311)*.

Urea Production Started At Allied's Omaha Plant

OMAHA.—Nitrogen Division, Allied Chemical & Dye Corp., has begun producing urea at its $25,000,000 ammonia-urea plant here.

The ammonia facilities have been in operation since the first week in May *(The Oil and Gas Journal, May 3, page 56)*.

Catalytic Construction Co., Philadelphia, built the plant, which is the first in the north-central agricultural area of the United States and is designed to produce over 100,000 tons of nitrogen products per year.



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SECOND NATIONAL is known as the "Oil Bank," and for good reasons. For instance—our producer-customers find the special services of the Oil and Gas Department extremely valuable. Through our Bank-by-Mail arrangement, the Oil and Gas Department furnishes customer producers complete up-to-the-minute single page records of run incomes from their wells—balanced against note requirements, and disposition of excess funds. This saves valuable time and the expense of record keeping.

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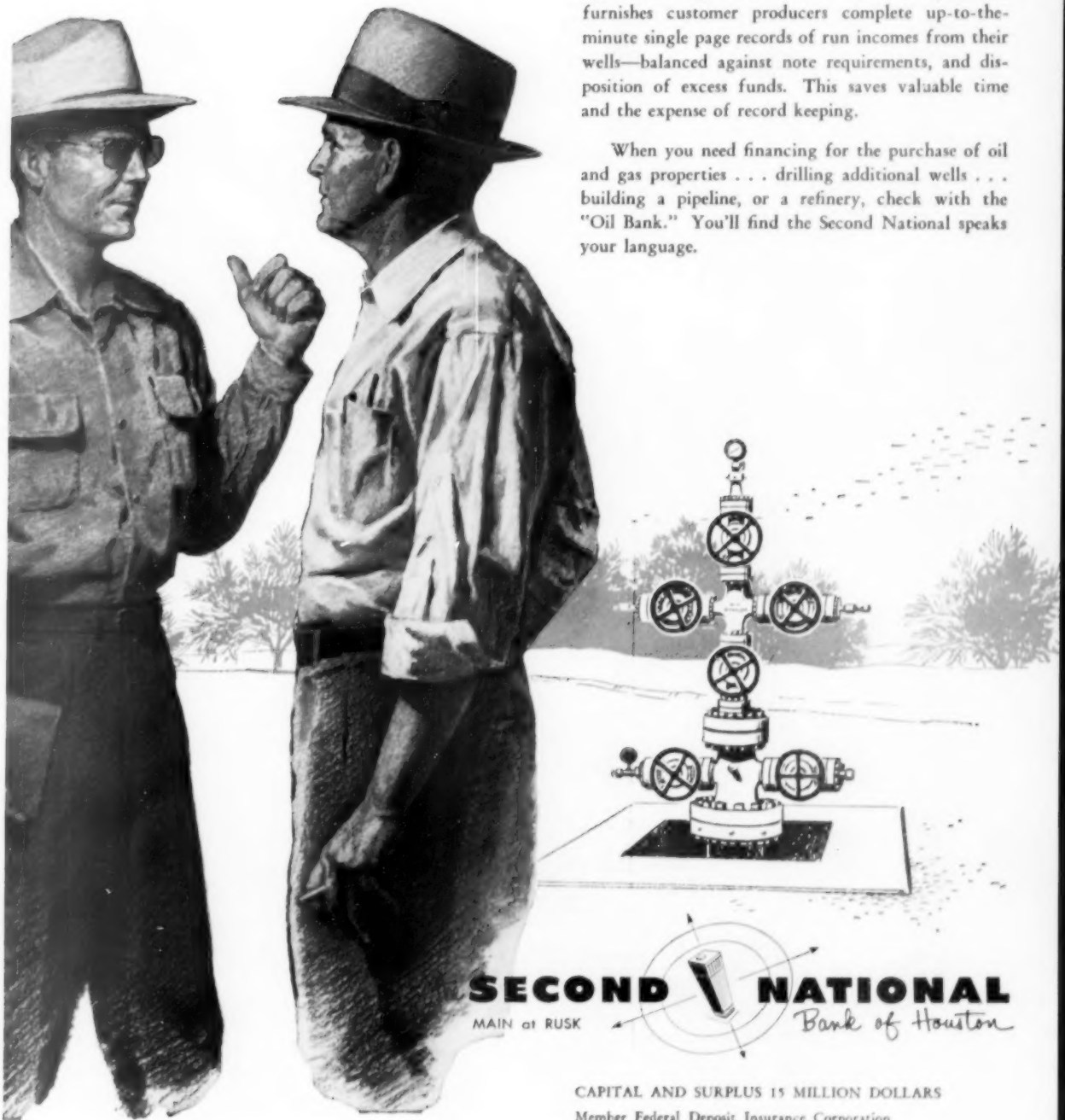

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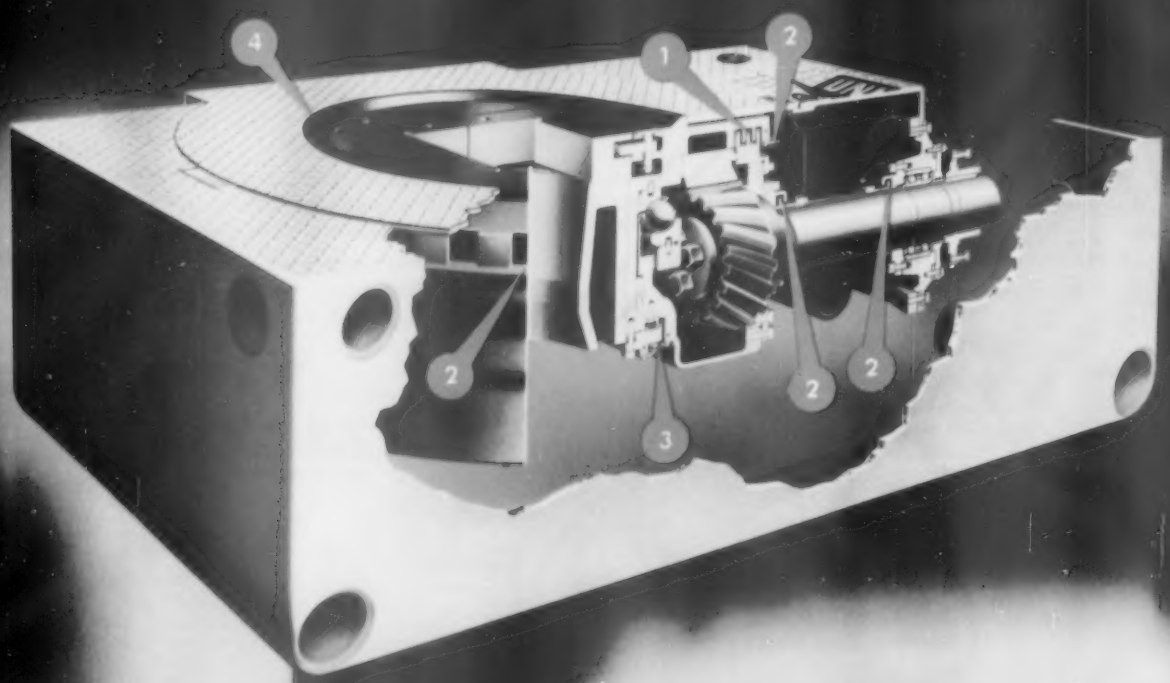


with . . .

DYNAMICALLY-BALANCED Table

During final inspection and factory run-in, as the crowning step in its precision manufacture, each Unit Rig Rotary Table is carefully balanced electronically. The dynamic balance achieved relieves vibration stresses, bearing and gear wear; assures quieter, longer and smoother maintenance-free operation.

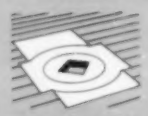
and it's really MUD PROOF!

1. Triple labyrinth seal stops foreign material from entering table.
2. Flinger rings and mud shields deflect mud from working parts.
3. Labyrinth seal checks mud before it can enter table from below.
4. Flush table top throws mud away from moving parts.

THREE MODELS AVAILABLE

with all these *features*, too . . .

ON THE SQUARE FOR FLOORING UP



The Unit Rig Rotary Table's all-square design makes flooring-up simple. The table top is free of projections and has non-skid treads for safety. 8 lift-holds make the Unit Rig Rotary Table easy to handle.

TABLE LOCK PROTECTS PINION AND BEVEL GEAR

Unit Rig's Table Locking Device locks the table only. Pipe-tong shock is not transmitted to gears, pinion shaft or bearings, eliminating a major cause of damage. The locking control handle is accessible from top of table, and is recessed for safety.

32 LOCKING SLOTS AROUND TABLE

Maneuvering for a locking position is eliminated by the 32 locking indents around the perimeter of the Unit Rig Rotary Table. Dollar-precious time is saved by the field-experienced design of the Unit Rig Rotary Table.

HARDENED, LAPPED AND MATCHED SPIRAL BEVEL GEARS

Only the finest parts go into the Unit Rig Rotary Machine, so quieter, smoother and stronger spiral bevel gears are standard. Each gear-set is flame hardened and lapped and matched for perfect operation.

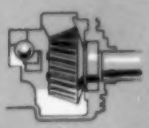
HEAVIER-DUTY MAIN BEARINGS

25 precision-ground and accurately matched 3" balls make this Unit Rig main bearing outstanding for rotary tables. The use of a phenolic retainer ring gives quieter operation and prevents abrasive metal particles from being introduced to the bearing.

QUICK-CHANGE DETACHABLE ROTARY SPROCKET

Unit Rig's Rotary Machine provides a wide range of speeds through easily attached sprockets bolted to the hub. Replacement of worn sprockets, or adaption to various rigs is easy and economical with this Unit Rig feature.

OIL BATH LUBRICATION



Main bearing, gear and pinion, and the inboard pinion shaft bearing are lubricated in a sealed oil bath with deep sump away from moving parts. The oil-level dipstick is accessible from table top. Longer trouble-free service and less maintenance are assured by Unit Rig's field-experienced design.

PROTECTED TABLE-TOP GREASE FITTINGS

Grease fittings to the outboard bearing, hold down bearing and locking device are easily reached through a hinged door in the table top. While covered and protected from mud and debris, they are readily accessible to the grease gun . . . another Unit Rig time-and-trouble-saving feature.

FLEXIBLE ROTARY GUARD CONNECTION

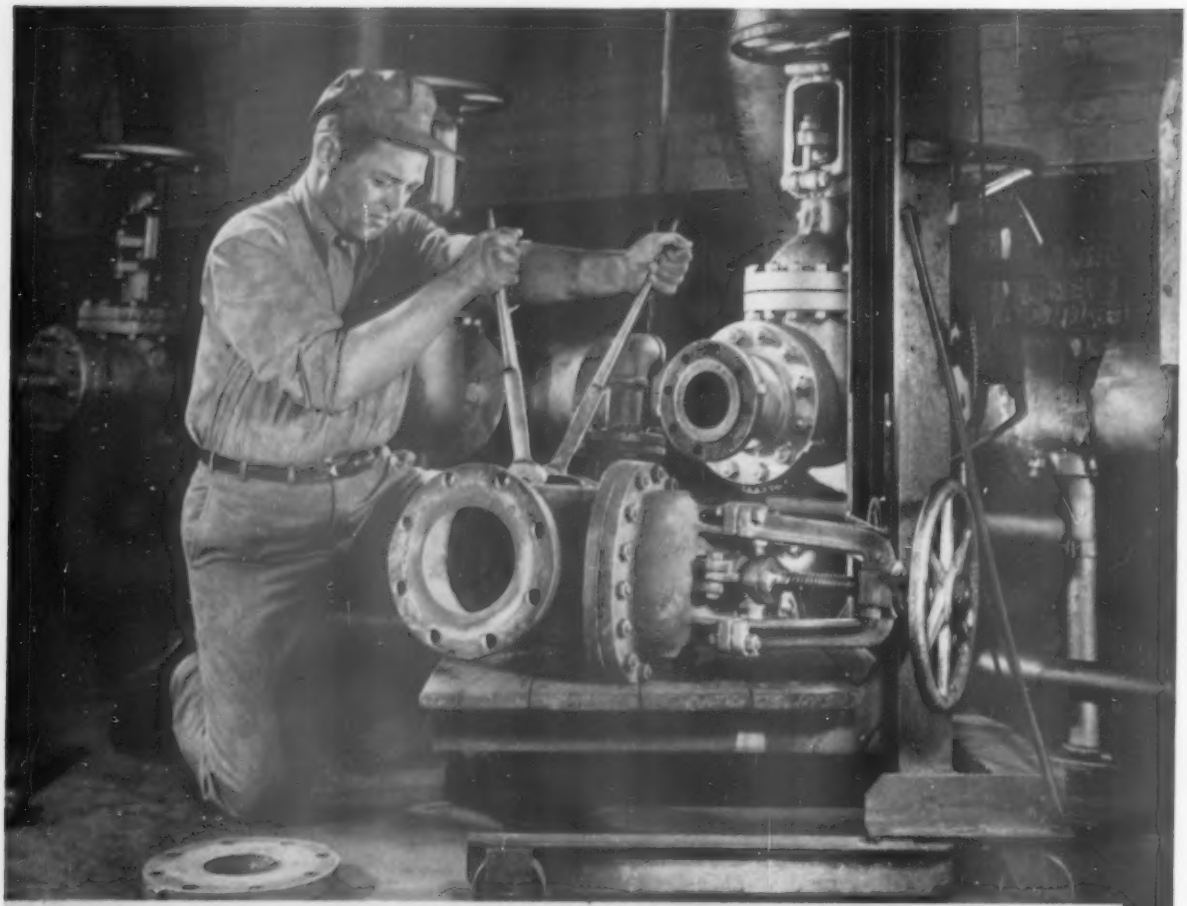
A large oil-resistant rubber diaphragm has been designed by Unit Rig to connect the table to the oil bath rotary guard. This large, corrugated wafer absorbs table movement, maintaining a tight seal to the guard.

RUGGED, SIMPLE MASTER BUSHING LOCK

Controlled from the table top, the master bushing lock is a simple, positive latching device to securely hold the master bushing in place. Master bushing bores are API.

UNIT RIG
& EQUIPMENT CO.
TULSA, OKLAHOMA U.S.A.

S-21-A (53¼" center to sprocket); S-17½-A Short (44" center to sprocket); S-17½-A Long (53¼" center to sprocket). S-17½-A tables may be modified to change center distance.



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Dan B. Miller

Nomad 34 Rated At 7,000 Ft.

The Nomad 34 is one of seven completely new drilling rigs for drilling up to 7,500 ft. Called the Lucky Seven series, the rigs are entirely new in every respect.

The new rig series is the result of 6 years' planning to provide the ultimate in portability and fast rig-up and moving commensurate with providing fast hole making and ease of operation for the crew. The rigs are also equipped with special considerations to assure safety to the crew. All moving parts are shielded or enclosed wherever practicable.

The Nomad 34 is a truck-mounted single-drum rotary-drilling rig. It is ideal for export use because of its space-saving compact unit. The rig may be equipped with one of Franks' telescoping derricks, which folds over the rig for location-to-location moving. It can also be used under a conventional derrick. The Nomad 34 is designed for drilling from 4,000 to 7,000 ft. *Franks Manufacturing Corp.*

Check No. 1 On The Time Saver Card

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Simplified Operation Found In New Electron Microscope

The Phillips EM-100 Electron microscope includes many features to provide simplified operation. Continuously variable magnification requires only the manipulation of one control. Instant conversion from microscopy to electron diffraction techniques is done without change of pole pieces, specimen transferral, or reevaluation.

A beam oscillator is provided for rapid determination of the precise focus. High-stability power supplies permit attainment of consistently clear images and low-chromatic aberration. Photography at highest magnification is feasible without special adjustment.

Resolving power is 30 or better. The direct-viewing screen, 8 in. in diameter, provides 50 sq. in. of viewing field. A light comparator, close to the screen, is used to evaluate the field intensity as a guide in planning micrographic exposures. The entire high-voltage system is completely enclosed and shielded. *Southwestern Electronics Corp.*

Check No. 2 On The Time Saver Card

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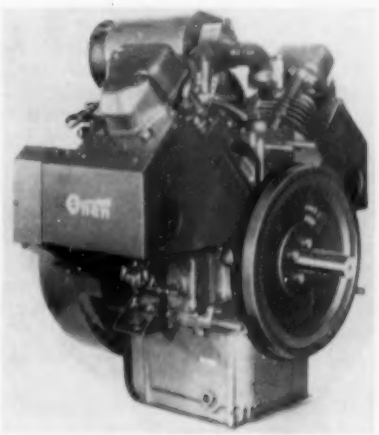
New Engine and Generator Exceeds Military Needs

A new lightweight, 140-lb., 21-hp. engine is manufactured to military standard parts specifications. This new two-cylinder, four-cycle air-cooled, gasoline-powered engine, designated Model VB, meets or exceeds all military specifications in design and construction. Of basic aluminum construction, this high-compression, overhead-valve engine has been tested and proven in 1,000-hour endurance runs.



Suction cooling of the engine by a large centrifugal blower collects the hot air and discharges it through a single outlet, permitting satisfactory performance in a small compartment. The engine will deliver a maximum of 19 hp., with accessories, at 3,600 r.p.m., assuring adequate power for scores of heavy-duty applications that require from 10 to 15 hp. (continuous).

Basically equipped for manual starting using an integral, self-winding rope starter, the engine can be provided with electric starting if desired. Either conventional crankshaft extension or flywheel drive can be furnished.

The electric generating plant powered by the new Model VB engine is the rugged, multiple-voltage Onan Model 5VB-4M, a 5,000-watt, 60-cycle, a.c. generating set. This skid-mounted unit meets all specified test requirements for Military Type II, Class A engine gen-

Now, for your convenience the NAME of each GRADE of Aerocat Fluid Cracking Catalyst indicates its PDI

* **Particle Distribution Index**
Key to Catalyst Efficiency

These three new grades of AEROCAT Fluid Cracking Catalyst, each identified by its PDI (the amount of catalyst in the 30-80 micron range), cover all fluid cracking unit requirements:

Aerocat 50/60 (Light) — for fluid units with low linear gas velocities, adequate dust disengaging space, excellent cyclone and Cottrell efficiency, low bed density needs.

Aerocat 60/70 (Intermediate) — for fluid units with moderate to high linear gas velocities, adequate catalyst recovery.

Aerocat 75/85 (Narrow) — for fluid units with high linear gas velocities, moderate disengaging space, limited recovery equipment.

Technical Data Sheet — "AEROCAT — Particle Size Distribution" — available on request.

As the result of a survey of the industry's cracking catalyst needs, Cyanamid has recently made available three new grades of AEROCAT fluid catalysts. Particle size distribution of each grade has been designed to offer optimum catalyst utilization under the entire range of existing fluid unit operating conditions.

Because of the importance of Particle Distribution Index in selecting the correct catalyst, we have gone a step further for your convenience. We have indicated the PDI in the *name* of each of these three grades of AEROCAT, as shown in the box.

For details, send for a new technical data sheet on the Particle Size Distribution of AEROCAT or discuss the subject with your Cyanamid Representative.

The convenience offered by this grading system is only one among many reasons why *8 out of 10 users of synthetic catalyst prefer* AEROCAT — and Cyanamid's service.

They also find AEROCAT the surest, most economical means for securing

- high octane yields
- high throughput
- low CO_2/CO ratio in flue gas
- high isobutane yield
- excellent heat, steam, sulfur stability

Aerocat® Fluid Cracking Catalyst

AMERICAN Cyanamid COMPANY
REFINERY CHEMICALS DEPARTMENT
30 Rockefeller Plaza, New York 20, N. Y.

In Canada: North American Cyanamid Limited, Toronto and Montreal

erating plants. It is built to withstand braking and dropping shocks, to resist high humidity, to start and operate at extreme temperatures, and will perform dependably at all angles up to 15° from horizontal. *D. W. Onan & Sons, Inc.*

Check No. 3 On The Time Saver Card

●

Floor Cranes Are One-Man Operated

Included in the Ruger hydraulic line are floor cranes in ½, 1, 2, and 3-ton capacities, and truck cranes in ½, 1, and 2-ton capacities. The standard 2-ton floor crane (shown) is 2 ft. 11 in. wide, with a space of 2 ft. 1 in. between the legs. It is 6 ft. 6 in. high with the boom horizontal, or 9 ft. 1 in. high with the boom at the highest position.

These cranes, operated by one man, have many applications, among which are handling heavy castings and forgings; transporting heavy parts to storage; loading and unloading trucks; and lifting, stacking, and tiering heavy boxes, crates, drums, and barrels. Other models are available for high-lift jobs and for straddling heavy loads when there is no floor clearance. *The National Supply Co.*

Check No. 4 On The Time Saver Card

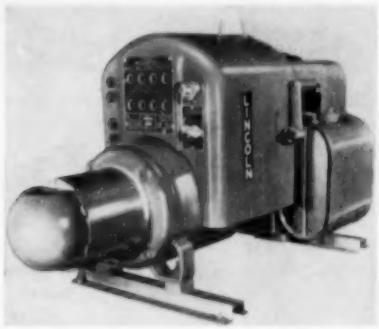
●

Combination Welder-Power Unit Features Low Cost

A new combination welder and auxiliary or standby power unit for maintenance work features low cost, large capacity, and simultaneous output of both welding and auxiliary current. The Weldanpower machine is rated as a 200-amp. welder and a 4-kva. continuous-duty power unit. For intermittent standby power, it is rated at 5 kva.

For industrial use the machine supplies a wide range of a.c. for maintenance welding to repair equipment breakdowns, repair worn parts, hard-face machine parts, or build special equipment. The machine also supplies 230/115-volt, 60-cycle single-phase a.c. standby power to operate grinders, drills, power tools, pumps, saws, and lights.

The Weldanpower unit is an a.c. alternator powered by a 12-hp. air-cooled gasoline engine. Rigidly coupled to the engine shaft is a four-pole laminated-steel rotor on which coils are wound. The stator has two separate windings, one for the welding circuit, and one for the power supply so that both power sources are available simultaneously.



Accurate voltage control of output insures efficient operation of electrical equipment. Normal voltages are held constant regardless of load variations. To produce a near-flat or constant-voltage regulation from no load to full load, the separate field exciter has two compound windings and a third series has field winding.

For welding, the operating panel provides taps which supply a.c. for use with electrodes ranging from 5/64 to 3/16-in. diameter. In addition to the tap range of output, a heat control is used to raise or lower the current from any one tap to suit exact requirements of the welding job. For auxiliary power, the panel provides a 230-volt outlet accommodating a standard three-prong plug and four outlets for 115-volt power which accommodate standard two-prong flat-blade plugs. *The Lincoln Electric Co.*

Check No. 5 On The Time Saver Card

●

Concrete Pump-Jack Base Makes Setting Easier

A concrete pump-jack base is designed for practically all makes of pump jacks including National, Jensen, Churchill, Alton, American, Bethlehem, and Cabot. It can also be made for any other jack, up to 12,000-lb. maximum line pull, upon request.

The spread front end and cutin sides give maximum support where it is needed, with lowest possible weight. This design makes leveling and plumbing easier. The base is made with prestressed reinforcing. Lifting and pulling rings relieve concrete of all strains and stresses. When required, a gas reservoir can be cast in the base.

Portable-sled construction makes moving easier when changing setups. Concrete is reamed away from top portion of anchor bolts to simplify installation. Lightweight aggregates can be used when desired to decrease overall weight without sacrificing strength. *Harry Byers & Sons, Inc.*

Check No. 6 On The Time Saver Card

●

Seal-Balanced Valves Eliminate Plug Unbalance

Balanced control at high-pressure differentials with tight shutoff is achieved with new seal-balanced angle valves. These valves embody all the advantages of Venturiflo design; corrosion resistant retained seat ring, reduced turbulence, Venturi throat design, and large-flow capacity. In addition they eliminate the plug unbalance usually associated with single-seated valves.

The force caused by line pressure working against the cross sectional area of the plug is cancelled out by means of a drilled hole along the axis of the plug, intersecting radially drilled holes near the top. Thus, the line pressure is transmitted through this passage and exerts a downward force on the plug equal to the upward force. As a result the valve may be positioned accurately at pressure differentials as high as 3,600 psi. with standard superstructures actuated by standard instrument air output.

Tight shutoff is attained by sealing

the pressure in the body bowl from the balancing chamber with the exclusive Dahl seal. With the plug on its seat, the line fluid would normally tend to flow through the space between the plug and guide and continue through the drilled passage to the downstream side. This is prevented by interposing a Dahl seal around the plug near the top of the guide. Made of an inert, frictionless plastic, this seal requires no attention or maintenance, and is completely resistant to corrosion or chemical attack. *Hammel-Dahl Co.*

Check No. 7 On The Time Saver Card

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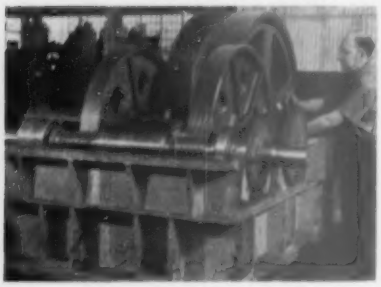

New Speed Reducers are For Heavy-Duty Application

A new line of large industrial speed reducers for application in heavy industry provides economical transmission of power at reduced speed from the prime mover to the driven machine.

The line consists of a series of single (Type WSH) and double-reduction (Type WDH) units. Thirteen standard ratios from 2.24 to 9.21 are available for WSH; 16 ratios from 11.3 to 70 are available for WDH.

The speed reducers are of the external-geared type with shafts arranged in a horizontal plane, resulting in high efficiencies. The design incorporates compact, rigidly-constructed fabricated gear cases, precision gears and pinions, antifriction bearings, and liberal-sized shafts. *Westinghouse Electric Corp.*

Check No. 8 On The Time Saver Card

●

Face Protector Fits on Safety Hard Hats, Caps

Inexpensive eye and face protection for wearers of safety hard hats and caps is available with the new Lumerith acetate clip-on and swing-back face shields. Large, clear, tough Lumerith windows offer effective eye, face, and throat protection. The clip-on model for hats or caps is secured by tight gripping, spring-steel clips that need only be pushed over the brim. It is

especially useful for the worker who wishes face protection occasionally and does not want to be burdened with the added weight and nuisance of permanent-type shields.

For the worker who needs face protection frequently, the swing-back model attaches to a safety hat by drilling and bolting to brim. The lightweight aluminum hinged bracket swings easily to any desired angle or to the overhead position.

Both clip-on and swing-back types are heat-formed to permanently hold their shape of .030 clear or green-tinted Lumerith. Swing-back-type standard depth is 10 in. Clip-on type is 6 in. deep for hat, and 6⅝ in. deep for cap. *E. D. Bullard Co.*

Check No. 9 On The Time Saver Card

●

New Industrial Engine Utilizes F-Head Design

The four-cylinder F-head industrial engine is a combination valve-in-head and valve-in-block construction. This design allows maximum valve diameters and increased breathing qualities. Because only the intake valves are in the head, there is a rapid, unobstructed flow of fuel to the combustion chamber.

The intake manifold is built integral with the head for water heating to give best possible mixture distribution between cylinders without overheating the charge at high load. The intake valves are operated by push rods through rocker arms in a conventional manner. Since only the exhaust valves are in the block, there is increased water jacketing to provide better control of heat. These valves are operated by conventional valve tappets.

Bore and stroke is 3⅛ x 4⅜ in., and the total piston displacement is 134.2 cu. in. Its maximum brake horsepower at 2,400 r.p.m. is 51 hp., and at 4,000 r.p.m. is 70 hp. At the same speeds, its maximum torque is correspondingly 111 and 91 ft.-lb. *Willys Motors, Inc.*

Check No. 10 On The Time Saver Card

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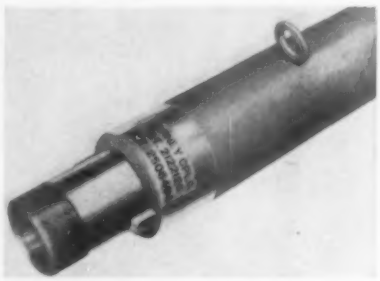

Built-In Clamp Increases Safety of Rotary Hose

A built-in safety clamp greatly increases the safety and strength of rotary hose. The safety clamp is an integral part of the hose. It consists of a metallic sleeve, with projecting eyelets, which is incorporated into the body of the hose.

Because the clamp is permanently built into the hose body the eye is always in the proper position to hold the hose securely in case of rupture. The possibility of rupturing is greatly reduced because external abrasion is eliminated. The fitting does not distort or restrict the hose and its passage, and actually affords additional reinforcement against distortion. By anchoring the fitting to the metallic elements of the hose body, strains are removed from the nonmetallic portions of the hose and distributed widely throughout the wall structure. *Goodall Rubber Co.*

Check No. 11 On The Time Saver Card

●

They're NEW

- Bulletins
- Catalogs
- Brochures

for your copy, check ✓ ✓ the Time-Saver Cards.

Cold-Frac With Hydrate Inhibitor. Catalog 33-02, a 20-page, illustrated booklet describes Model GDH which features maximum condensate recovery, stock tank liquid with controlled stability, and dehydrated gas. The catalog includes color flow diagrams, installation photos, case histories, and charts and graphs to assist in working out recovery problems. *Black, Sivalls & Bryson, Inc.*

Check No. 12 On The Time Saver Card

●

Geological Surveys With Radioactivity Measuring Equipment. A brochure describing instrumentation for aerial or ground surveying for radioactive materials explains scintillation counting equipment and how it is used as an aid in exploration for oil or for prospecting for uranium ores. Oil deposits may be found by surveying for land with lower radioactivity than the surrounding area, a "halo" of relatively intense radiation, and a concentration of hydrocarbons. *Nuclear Instrument & Chemical Corp.*

Check No. 13 On The Time Saver Card

●

Carbon-Steel Electrodes For Use With Inert-Gas Shields. Reprinted from The Welding Journal, the 12-page booklet is a study of the properties of electrode weld deposits, for production use in the welding of carbon steel by the inert-gas-shielded metal-arc process. Pictures of weld specimens and numerous charts make this technical booklet a guide in selecting carbon-steel electrodes for a particular job. *Air Reduction Sales Co.*

Check No. 14 On The Time Saver Card

●

Motorized Reducers. Of practical interest to men who buy or use gear drives up through 75-hp. rating, new Bulletin 3100-1954 consolidates tables, dimensions, weights, overhung load ratings, and thrust-capacity ratings needed to select horizontal, vertical, or right-angle Falk Motoreducers in either the all-motor or integral design. A foldout section bound in the middle of the book contains illustrated information on mounting positions, low-speed shaft connections, and product features. *The Falk Corp.*

Check No. 15 On The Time Saver Card

●

Meters and Controls for the Process Industries. Instrumentation for the modern process plant is presented in the new 16-page, 1954 edition of Bulletin 17. Detailed equipment descriptions and illustrations include basic specifications for measuring, transmitting, receiving, interpreting, and controlling 18 variables normally encountered in production processes. *Bailey Meter Co.*

Check No. 16 On The Time Saver Card

●

Solenoid Valves. New one-page Bulletin A-3 describes and illustrates additions to a line of general-service solenoid valves. Included in the new models are normally closed or normally open types in three sizes: 1, 1¼ and 1½ in., designed to eliminate hammer and shock in automatic or remote control of steam, air, gas, or liquid flow. Features include cast-bronze construction, piston-pilot operation, and full ports.

THE WmSON PIG-SIG . . .

signals the passage of all pipeline scrapers

PIG SIG

INSTALLING A PIG-SIG . . .

1. **WELD the housing to pipe.**
2. **DRILL a hole into pipe with Tapping Machine.**

ALL WITHOUT SHUTDOWN OR LEAKAGE of pipeline in service

The Pig-Sig is a mechanical device welded to pipelines to indicate the arrival or departure of any pipeline scraper, pig, or swab. A hole is tapped in the line (under pressure) using a standard **WmSON-HILLCO TAPPING MACHINE.** The trigger, extending down through tapped hole, is tripped when scraper passes, actuating a visual signal or an electrical indicator (micro switch).

PIG-SIGS cut operating costs . . .

a. **Reduce down-time of booster stations**
b. **Save man-hours searching and waiting for scrapers**

Tested to 1500 p.s.i. shaft is sealed with O-Rings and Chevron packing.

T. D. Williamson, Inc.

THE PIG WITH THE POKE CLEANS PIPE LINES

P. O. BOX 4038
TULSA 9, OKLAHOMA

REPRESENTATIVES . . . HOUSTON • BATON ROUGE • PITTSBURGH • KENILWORTH, N. J. AMARILLO • CASPER • PROVO, UTAH • LOS ANGELES • OAKLAND • EDMONTON CALGARY • TORONTO • BUENOS AIRES • DURBAN, NATAL, SOUTH AFRICA

The new models handle pressures from 1 to 300 psi., and steam to 150 psi. *J. D. Gould Co.*

Check No. 17 On The Time Saver Card

●

Rustgon. A new, nonacid rust-removing material that simultaneously strips paint, rust, and primer from ferrous-metal surfaces is described in a new four-page multicolored bulletin. The liquid-alkaline material requires only two steps; a dip and a pressure rinse. Parts to be derusted and stripped of paint and primer are merely immersed into the Rustgon hot tank, withdrawn, and then rinsed with air-and-water or with steam. *Turco Products, Inc.*

Check No. 18 On The Time Saver Card

●

Engineering Models. A new brochure shows facilities for producing scale models of process plants, laboratories, plant layouts, and industrial products. Extensively illustrated, example models are shown with approximate prices. The procedure for using scale models in the engineering of new plants and related advantages are clearly pointed out. *Industrial Models, Inc.*

Check No. 19 On The Time Saver Card

KOHLER ENGINES

4-CYCLE
AIR-COOLED

K90

K160

K90 3.6 H.P.
K160 6.6 H.P.
K330 11.8 H.P.
K660 26.8 H.P.

Kohler Engines are engineered and manufactured to the high standards which have made the Kohler mark known for quality the world over.

Power for garden tractors, pumps, sprayers, snow removal equipment, grain elevators, hoists, portable saws, concrete mixers, compressors, industrial lift trucks.

Write for information

K330

K660

Kohler Co., Kohler, Wisconsin
Established 1873

KOHLER OF KOHLER

PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS
AIR-COOLED ENGINES • PRECISION CONTROLS

New Rodless Pump Bulletin. A new bulletin describes a rodless oil-well pump. Diagrams of the pump application and figures of pump efficiency are included. Full-color illustrations show pump operation, and charts give pressure-volume data. *Sargent Engineering Corp.*

Check No. 20 On The Time Saver Card

●

Hy-Vo High-Speed Chain Drives. A revised 16-page illustrated Catalog C72-51 includes new and expanded data on capacity ratings of Morse Hy-Vo high-speed, heavy-duty chain drives. Operating principles and test data are included for drives that will carry up to 190 hp. per in. of chain width at continuous chain speeds up to 6,000 ft. per minute. *Morse Chain Co.*

Check No. 21 On The Time Saver Card

●

Field-Proven Balanced Power Slips. The four-page, two-color bulletin features annotated photograph of the complete unit. The illustration clearly shows such features as the balance, flotation, safety features, and linkage. Power slips are shown on a mock-up rotary table to show details of installation. *Web Wilson Oil Tools, Inc.*

Check No. 22 On The Time Saver Card

●

Flexible Flow Lines. Comprehensive 12-page illustrated catalog gives general information and detailed specifications on 35 styles of bronze and steel, plain and flanged swing joints. Recommendations and information on use, care, and maintenance of equipment are enclosed. *OPW Corp.*

Check No. 23 On The Time Saver Card

●

Casing Patch is a four-page brochure on the specialized tool that serves as an effective connection which simplifies permanent restoration of a damaged casing string. The bulletin covers operation, use, parts, and assembly. *Bowen Co. of Texas.*

Check No. 24 On The Time Saver Card

●

Tri-Non Infrared Process-Stream Analyzer. A new six-page illustrated folder describes the analyzer for continuous in-plant process-stream analysis. Principles of operation, detailed specifications, and features are given, with emphasis on the Tri-Non analyzer's outstanding characteristics of sensitivity, selectivity, stability, dependability, and serviceability. *The Perkin-Elmer Corp.*

Check No. 25 On The Time Saver Card

HOLD ANY PACKER DOWN

. . . With a Guiberson Hydraulic Anchor

The Type "H1" Hydraulic Anchor is recommended for use with all Guiberson production-type packers — or any other comparable production-type packer — as a positive means of holding the packer and tubing down while the well is pressured below the packer, as in acidizing or formation-fracture processes. It is also recommended for use in anchoring the tubing and packer in gas or water injection wells where the tubing pressure will exceed the casing pressure. The "H1" can be effectively used as a Hydraulic Anchor to keep the tubing from "breathing" in pumping wells having low working fluid levels.

Simplicity of design and completely automatic operation make the "H1" exceedingly easy-running, easy-pulling — it may even be run upside down without the slightest effect on its operation. Case hardened piston slips in Monel inserts assure positive action and maximum corrosion resistance. Piston slips operate independently and provide equal distribution of gripping force against the casing I.D. with no localized high pressure areas. This, coupled with a limited piston slip stroke, positively precludes swaging or damaging casing in any way. Piston slip gripping area is 100% effective in any weight casing within the anchor size range. "H1" anchors are individually tested and will hold any pressure the tubing will stand.

TYPE "H1"

THE
GUIBERSON
CORPORATION
ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.
Sold By Leading Oil Field Supply Stores Everywhere

R. S. DEAD WEIGHT GAUGE

the practical and accurate method of checking

- Line pressures.
- Rock pressures at wells.
- Static pressure on orifice meters.
- Gas pressures on pipeline leakage tests.

This instrument is based on the principle of generation of pressure by application of a known weight to a hydraulic piston of known area. Conversely, an unknown pressure can be measured by balancing its force on a piston of known area with a known weight—the result is extremely accurate pressure readings.

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Cenco . . . one dependable source of supply for everything you need in scientific instruments and laboratory supplies. Over 15,000 items . . . 14 branch offices and warehouses.

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REPUBLIC "LO-TORQ" SELECTOR VALVE

- 0-6000 psi service
- Low turning torque
- Panel mounting
- Semi-steel, bronze, aluminum alloy
- No leakage at any time
- 3 types of portings

Write for catalog No. 454 for complete information.
Distributors in principal cities from coast to coast.

132

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15655 BROOKPARK ROAD • CLEVELAND 11, OHIO

more money in the bank . . .

YOU SAVE when you log as you drill with Geolograph because Geolograph gives the driller the information he needs to do the most efficient job! Shallow or deep . . . you get more for your drilling dollar with Geolograph on the job!

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EQUIPMENT MEN . . . in the News

Orbit Valve Names Pitts To Williston Basin Area

James M. Pitts has been appointed to represent Orbit Valve Co. in North Dakota and Montana with headquarters at Williston, N. D. Pitts is a graduate of Ottawa University, Ottawa, Kans., and was connected with Northern Utilities, Casper, Wyo., before going with Orbit.

O-C-T Names Delaney to Oklahoma City Territory

William Delaney has been made sales representative in the Oklahoma City area for Oil Center Tool Co.

After several years general experience in drilling and producing in the oil fields, Delaney joined O-C-T as a serviceman and sales representative in 1951. He worked in the East Texas, North Louisiana, and West Texas areas. He resigned from O-C-T in August 1953 to form his own business. He returned to the company in his present position July 1.

Salvatori Elected to Consolidated Board

H. SALVATORI

Election of Henry Salvatori, petroleum-industry leader and president of Western Geophysical Co. of America, to the board of directors of Consolidated Engineering Corp. has been announced by Philip S. Fogg, president of the Pasadena, Calif., electronic instruments firm.

Prominent in the petroleum industry for more than 30 years, Salvatori earned international recognition for pioneering geophysical oil-exploration techniques which have become industry standards. Head of Western Geophysical since 1932, Salvatori directs activities of one of the world's large exploration organizations.

Salvatori was employed by Bell Telephone Laboratories as a research engineer from 1923 to 1926 at which time he joined Geophysical Research Corporation, Newark, N. J., to act as party chief on one of the nation's first experimental reflection seismograph parties. In 1929 he joined Geophysical Service, Inc., and in 1932 organized Western Geophysical.

Salvatori is also president and principal stockholder of Grant Oil Tool Co., Vernon, Calif., which is full owner of MacClatchie Manufacturing Co., Los Angeles oil-tool firm.

Rolo Increases Plant Facilities at Houston

A 40 per cent increase in plant facilities of Rolo Manufacturing Co. has been announced by R. K. (Bob) Franklin, founder and owner of the Houston company which manufacturers Wellcheckers for the oil-producing industry.

The plant expansion is part of Rolo's planned development program to keep production capacity up with product demand. Additional facilities have also been made available for the production of new metering equipment being developed by the company.

Rolo Manufacturing Co.'s executive staff inspecting the progress of the company's Houston plant expansion which will increase present facilities by 40 per cent. Left to right: Ray S. Kail, sales manager; R. G. Oliphant, acting chief engineer; J. L. Kepple, assistant general manager; and R. K. (Bob) Franklin, founder and owner.

Goode, Smith Named as District Managers

Gustin-Bacon Manufacturing Co., Kansas City, has announced the appointment of two new district managers: C. Weston Goode, southeastern United States, and H. J. Smith, Kansas City sales division.

Goode, Atlanta sales representative for Gustin-Bacon since 1944, is in charge of the newly opened district office at Atlanta.

Smith has been with the company since 1949 as representative in Louisville and St. Louis. In his new position he will direct sales in Colorado, Wyoming, Nebraska, Kansas, Oklahoma, Arkansas, Texas Panhandle, southern Illinois, western Tennessee, and northern Mississippi.

C. W. GOODE

H. J. SMITH

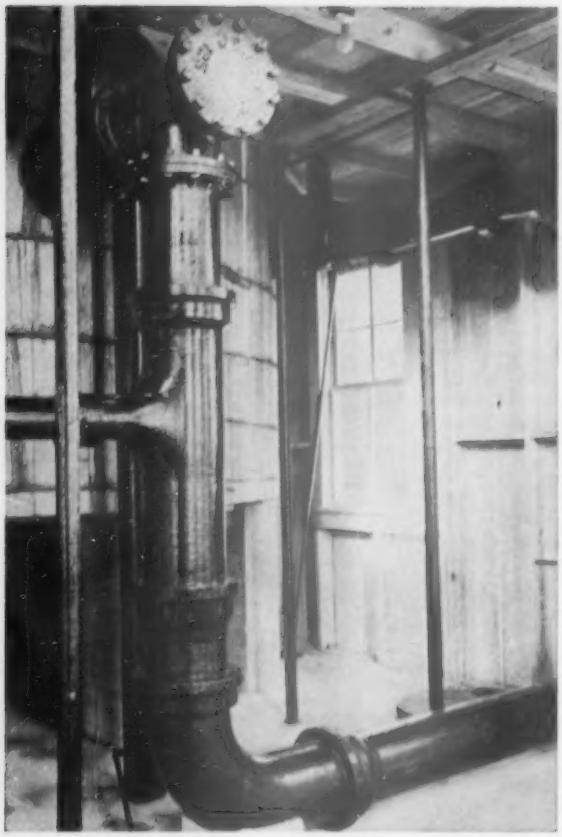
Oilwell Announces Mid-Continent Changes

J. W. COBURN

Mark Barkhurst, Mid-Continent area manager for U. S. Steel's Oil Well Supply Division, has announced the following promotions.

John W. Coburn, manager of the Shreveport, La., store, has been promoted to assistant district manager, Oklahoma district, with headquarters at Oklahoma City. Kendall E. Woods has been made district engineer, machinery and equipment sales at Oklahoma City, and Royal F. Shaner has been named assistant to area engineer, Mid-Continent area, at Tulsa.

Coburn joined Oilwell at Dallas in 1937, and later that year transferred to the Luling, Tex., store. From 1941 to 1945 he was on leave of absence to serve with the U. S. Army, rejoining



DIRECT ROUTE TO LOWER PLANT MAINTENANCE

The direct and indirect expense of replacements of short-lived refinery pipe lines can be reduced, or avoided altogether, by the use of cast iron pipe. This has been proved by many refineries whose maintenance costs have been lowered by replacing other pipe materials with cast iron.

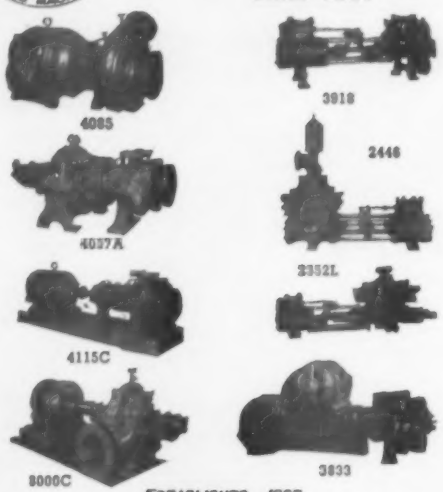
A relatively low first-cost material, cast iron pipe is usually cheapest in the end, for many refinery applications, because of its stubborn resistance to corrosion. Available with bell-and-spigot, plain end and flanged, or with standardized mechanical joints.

Cast Iron Pipe Research Association,
Thomas F. Wolfe, Engineer,
1015 Peoples Gas Bldg., Chicago 3, Illinois.

CAST IRON PIPE
FOR LONG LIFE AND ECONOMY

PUMPS

CENTRIFUGAL
RECIPROCATING
BUILDERS OF OUTSTANDING PUMPS
Since 1869



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DEAN BROTHERS PUMPS INC.
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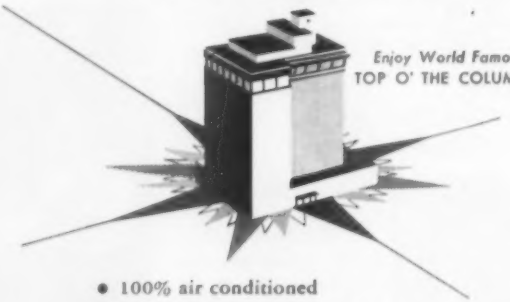
Tops for Business Trips!
THE COLUMBUS
Miami's Finest Hotel



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- Ticket office hub of all airlines serving Miami

17 floors up... fine cocktails and dinners... enjoy Miami's most spectacular view of Biscayne Bay through walls of glass.

THE Columbus HOTEL
Biscayne Boulevard at First Street, Miami, Florida C-4

the organization at the Shreveport store. He became store manager there the following year.

Woods joined Oilwell in 1946 as a field engineer at Ellinwood, Kans., with 6 years' previous oil-field experience. He subsequently served as district representative at Ellinwood and El Dorado, Kans.

Shaner, formerly district engineer, machinery equipment sales and service, had held that post since April 1952. Prior to that he was located at Wewoka, Okla., where he served successively as manager of Oilwell's Wewoka store, assistant district engineer, and district engineer.

McCullough Opens Service Branch at Harvey, La.

O. E. PETTY

Orwin E. Petty has been appointed branch manager of the new McCullough Tool Co. service branch at Harvey, La., according to O. J. McCullough, vice president.

Petty has been employed for the past 4 years in the McCullough eastern division headquarters at Houston in the research and development department. Prior to joining McCullough he was plant superintendent of Baura Co., Houston.

Harvey represents the fifth McCullough service branch in Louisiana. The other branches are located at Lake Charles, Houma, New Iberia, and Shreveport.

H. Wotkyns Joins Abegg & Reinhold in Mid-Continent

H. (Inky) Wotkyns, formerly vice president of the Mid-Continent division of Baash-Ross Tool Co., has become a new member of the staff of Abegg & Reinhold, manufacturers of Varco oil-well tools.

Wotkyns will begin his new duties immediately as Mid-Continent sales manager for Varco, with headquarters in Oklahoma City. Wotkyns comes to Varco after 18 years with Baash-Ross, during which time he gained a wealth of experience in the manufacture and sales of oil-well tools.

Dowell Makes Fagan Development Engineer

R. D. FAGAN

Robert D. Fagan, of Midland, Tex., has joined Dowell Incorporated, Tulsa, with the title of development engineer, A. C. Polk, vice president and general manager, has announced.

Fagan will work with Dr. W. Wray Love, director of research, on modification of Dowell oil-well servicing equipment used in all pumping services offered by the company, including fracturing, acidizing, and cementing.

Fagan is a former division manager for Byron Jackson, Inc., Midland, and its predecessor, International Cementers, Inc. He also worked with Pacific Cementing Co.

Ideco Made Exclusive Export Representative for Mayhew

Ideco, one of the Dresser Industries, with headquarters in Dallas, has been appointed exclusive export distributor for Mayhew portable rotary drilling equipment, according to George W. (Jack) Walton, Ideco vice president. Ideco will also distribute Mayhew products domestically on a nonexclusive basis.

Mayhew equipment, manufactured by Mayhew Supply Co., Inc., of Dallas, includes a complete line of truck and trailer-mounted rotary rigs ranging in size from Model 200, designed for 200-ft. drilling depths, to Model 3000 for 3,000-ft. depths using 4½-in. drill pipe. They are in widespread use in geophysical operations and for drilling and servicing shallow water, oil, and gas wells.

Grant Appoints Ringle As Sales Manager

Grant Oil Tool Co., Los Angeles, has just announced the appointment of Robert E. Ringle as sales manager for both Grant and its subsidiary, MacClatchie Manufacturing Co., Compton, Calif. In his new capacity, Ringle will guide the expanding sales activities of the two concerns, which will include the addition of new sales and service branches in active oil territory. The new sales manager has just recently returned from an extended trip to all service branches of the company in the Mid-Continent and Gulf Coast.

Ringle, who started as a salesman on a straight commission basis, and who later became a machine operator in a manufacturing company, also brings to Grant and MacClatchie an extensive background in industrial sales and management.

Homco Appointed Wheland Distributor

Houston Oil Field Material Co. is now a distributor for Wheland Co., of Chattanooga, Tenn. Wheland is one of the nation's oldest manufacturers of rotary drilling equipment.

The new distributorship agreement was signed recently at Homco's home office in Houston. Wheland equipment is already available at all Homco stores. Large inventories of parts are held in Homco's centrally located warehouses.

The Wheland field sales and service representatives work closely with Homco's staff in all areas where stores are located. There are 18 stores throughout Texas, Louisiana, New Mexico, and Wyoming.

Cecil W. Hays, Wheland sales representative, is shown with Homco home office and Houston store personnel. Left to right are: Hays; B. W. Bowden, J. C. Seale, store manager; George H. Haltom, manager, machinery sales; and George Bean, general sales manager.

Here's a Life-Line "A" stator that has been given multiple dips and bakes of Bondite. There is no evidence of vapor penetration after being exposed to the toughest insulation test—a jet of steam.

Try tearing a piece of Life-Line's slot insulation, Mylar*. Mechanical strength is eight times greater than ordinary slot cells. Dielectric strength is ten times greater than standard design requirements.

*Trade Mark for Du Pont polyester film

There's more to motor insulation than its ability to repel water

These demonstrations show how new *Life-Line A* insulating materials provide greater protection for wire, slots and complete stator.

New and improved motor insulations are the word of the day. Actually, there is a considerable range between the run-of-the-mill "improved" insulations and the really outstanding types now available. There is only one way to judge them—by comparison.

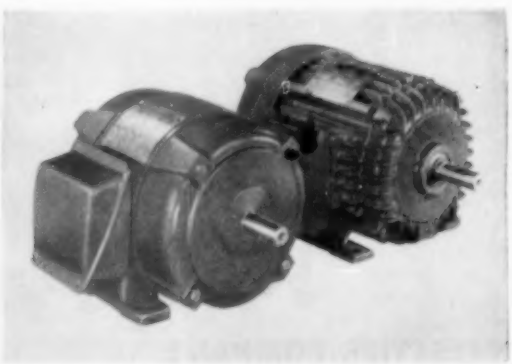
For example, many new stator insulations do a more effective job of shedding water. But Life-Line's® new Bondite goes a step further . . . it repels vapors that penetrate ordinary water-shedding insulations.

The secret is in the silicone additive that is impregnated throughout Bondite instead of being just applied as a thin outer layer. The complete story of Life-Line's Bondite, Bondar and other new motor improvements is contained in the new Life-Line Booklet B-6154. For your copy, write: Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. J-21847-A

YOU CAN BE SURE...IF IT'S Westinghouse

A duck's ability to shed water is only feather deep. A simple wetting agent dissolves the duck's protective coating and he sinks. Many water-shedding motor insulations react much the same; expose them to a simple solvent and they deteriorate.

These two coils have been baked for 50 hours at 400° F. Bent around a finger, the ordinary insulation on the right coil flaked off. Life-Line's Bondar insulation on the left remained intact.



Dependable performance takes balanced design. That's why *every* component in the new Life-Line "A" has been redesigned and integrated with the whole. The result is a motor with superior performance.

$23,303 SAVED WITH DRISCOSE* LOW SOLID EMULSION!

Consistent for high performance, DRISCOSE low pH, low solid emulsions help drillers get the best possible penetration. In West Texas a recent case history with low solid, low pH DRISCOSE emulsion revealed a saving of 28.5% in drilling days, with a 16.6% saving in number of bits used . . . resulting in a saving of $23,303.

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DRILLING SPECIALTIES COMPANY BARTLESVILLE, OKLAHOMA

*DRISCOSE is a trademark for Sodium Carboxymethylcellulose.

EXPLORATION

Rockies Poised for Northwest Push

by Frank J. Gardner

A freeway to the future, and the great white hope of the Rocky Mountain oil industry is this black ribbon winding 1,466 miles across the map of the western United States. It is the proposed route of the Pacific Northwest Pipeline from the San Juan basin to the rich gas markets of the Northwest.

Regional significance . . . The route traverses a wide area of relatively unexplored territory as far as wildcat drilling is concerned—an area often referred to as the most promising within the continental limits of the United States.

The nest of basins outlined on the map is of substantial interest for future wildcatting, and provides a hunting ground encompassing 48 million acres of undeveloped potential oil lands. Half of it is under lease.

Explorationwise, what will it mean? As the almost unlimited markets of the Northwest and West are brought into reach via this San Juan-to-Seattle outlet, the implications point to a quickened program of exploratory drilling all along its path. The quest for production will gravitate westward from the Continental Divide. Fuller development of older fields is sure to occur; some of them have proved gas reserves that have been shut in for more than 20 years for lack of outlets. Wildcats will go down in remote spots that have been studiously avoided heretofore, and our store of geological knowledge will benefit accordingly.

New life already . . . Even now, the pace has quickened; leasing is accelerated all along the course of the pipeline, and wildcat announcements already made reveal the shape of things to come. Old prospects not previously drilled because of remoteness are coming under close scrutiny. Geophysical-crew activity is significantly concentrated in the basins to the west, especially in Green River, Uinta, Black Mesa, and the Great Basin.

San Juan basin . . . The most immediate effects of the Pacific Northwest project are evident in sprawling San Juan, where commitments already made and discussed in Federal Power Commission hearings guarantee expanded exploration.

Black Mesa basin . . . Interest in the Black Mesa country is centered on Shell Oil Co.'s activities in Apache County, Arizona, where one test was finished as a noncommercial gasser and another is on the way down. To the northeast, in the southeastern corner of Utah and in the Paradox basin, Shell is probing in a second test for Cambrian production at 7,100 ft., and Carter Oil Co. is to test for 8,000-ft. Devonian at White Mesa.

Uinta basin . . . An area of 8,500 sq. miles in eastern Utah and western Colorado is a real challenge and a storehouse of petroleum potentialities. This is the Uinta basin. With its new position astride the pipeline, Uinta can be expected to surpass all expectations in new discoveries during the next 5 years.

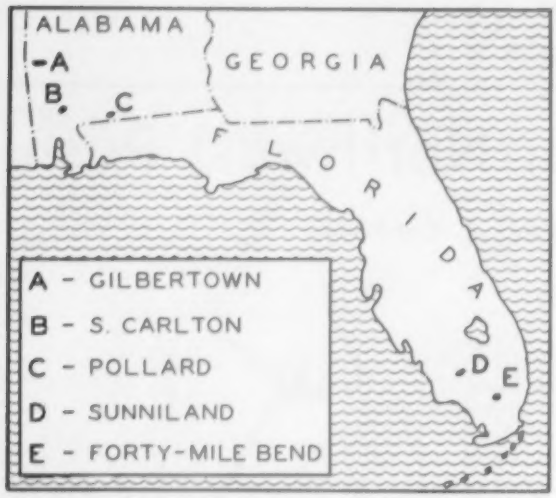
Green River basin . . . Interesting new developments are already under way in Green River, least-explored and most promising basin in Wyoming. Continental Oil Co., El Paso Natural Gas Co., and Malco Refineries will drill the great Pinedale anticline of Sublette County to a depth of 15,000 ft., and Carter is well along on a 6,000-ft. test of the Carson Peak structure in Daggett County of northeastern Utah. These two important wildcats lie on opposite sides of the pipeline route.

Ultimate effects . . . New drilling and completion practices have revolutionized the gas-finding business. Drilling with air and gas, and the use of oil-base muds have resulted in successful wildcats that would no doubt have failed with earlier techniques. As a result, operators are planning entirely new programs, using new procedures that will hold higher promise of success over the coming months.

The recent success in Nevada presents the possibilities of the Great basin of Idaho, Utah, and Nevada in a new light; we may expect to see the oil map of those states splashed with producing fields, and even the secrets of Harney and Bellingham may yield to the probing bit of oil hunters in the Northwest.

As the industry adopts new methods and pierces new and virgin areas of exploration, a significant push to the northwest will occur. Reservewise, the Rockies offer the greatest future potential in our country. Explorationwise, they are destined to outstrip all other regions by 1960. Pipelinewise, they are on the freeway to an unprecedented future via the great black ribbon of steel.

ROCKIES TO NORTHWEST . . . Pacific Northwest Pipeline will quicken exploratory drilling all along its sprawling path.



FIVE PRODUCING FIELDS of the southeastern states lend encouragement to the belief that they will eventually constitute a major oil province.

Southeastern States Hold Promise for Tomorrow

by J. L. Patton

SOUTHERN ALABAMA, southern Georgia, and Florida contain approximately 85,000 sq. miles of land, an area roughly one-third the size of Texas. From the Mississippi-Alabama border to the Florida Keys is a distance of about 700 miles. There are five oil fields in the area, as listed below:

1. Sunniland, in Collier County, Florida.
2. Forty Mile Bend, in Dade County, Florida.
3. Pollard, in Escambia County, Alabama.
4. South Carlton, in Clarke County, Alabama.
5. Gilbertown, in Choctaw County, Alabama.

There have been 671 wells drilled in this area of which 59 have been producing wells. The wells in southern Alabama, southern Georgia, and northern Florida are usually drilled to the lower Tuscaloosa formation of Upper Cretaceous age which is reached between the depths of 4,500 to 6,000 ft. In southern Florida the wells are usually drilled to the Sunniland horizon of Lower Cretaceous, Glen Rose age, and usually reach this objective between 11,400 and 12,000 ft.

The author is division geologist, Eastern Division, Humble Oil & Refining Co., Tallahassee, Fla.

The main structural features of the area are as follows:

1. The Ocala uplift.—This is a large structural feature trending northwest-southeast through southern Georgia and North Central Florida. Approximately 70 dry holes have been drilled on or around this feature.

2. The South Florida embayment.—This extends from the south side of the Ocala uplift to the Straits of Florida just south of the Florida Keys.

3. The Hatchetigbee anticline and the Jackson fault.—The Hatchetigbee anticline is located in Choctaw, Clarke, and Washington counties, Alabama. This feature trends northwest-southeast. The Jackson fault lies east and south of the Hatchetigbee anticline and has a displacement of as much as 1,500 ft.

4. The Southwest Georgia embayment.—This is a basin or trough located between the Ocala uplift on the east and the Decatur arch on the west and is geographically located in southwestern Georgia and northern Florida.

5. The Decatur arch.—This is a southward-plunging fold located in southwestern Georgia, southeastern Alabama, and northwestern Florida.

6. The Southeast Georgia basin.—This is a shallow embayment in southeastern Georgia and northeastern Florida. This basin has had only a few wells drilled in it and little is known about it.

7. The Mississippi Interior salt dome basin.—This is a large embayment extending across southern Mississippi and probably closing against the Hatchetigbee anticline and the Jackson fault. There is one known piercement dome in Alabama located near McIntosh in Mobile County.

Stratigraphy

This southeastern area is divided into two distinct geologic provinces on the basis of sedimentation. In the northwestern part, including southern Alabama, southwestern Georgia, and western Florida, the sediments are predominantly clastics, that is, sands and shales. To the southeast, these formations become calcareous and south of a line across North Central Florida they are, for the most part, limestones, dolomites, and anhydrites. Beds ranging in age from Jurassic or older to Recent are present in southern Alabama, western Georgia, and western Florida; from Paleozoic to Recent over the Ocala uplift, and from questionable Jurassic to Recent in southern Florida.

The Jurassic of the northwestern part of the area is composed of red shales and sands in the Cotton Valley formation; limestones, dolomites, anhydrites, and salt in the Haynesville (Buckner); and of limestone and sand in the Smackover. Above the Jurassic are the red and gray shales and fine to coarse sands of the Lower Cretaceous, which are in turn overlain by the sands, shales, and chalk of the Upper Cretaceous. Formations of sand, shale, and limestone make up the Cenozoic.

In the Ocala uplift region, wells penetrate into shales and quartzitic sandstone beds of Paleozoic age. The upper section here is one of transition from the clastics of the northwest into the carbonates to the south. Wells near the crest of the uplift have thin or entirely missing formations due to being pinched out against the uplift. Some wells have drilled from beds of Austin age (Middle Upper Cretaceous) into Middle Paleozoic or older rocks with no trace of the basal Upper Cretaceous, Lower Cretaceous, Jurassic, or Triassic and, in fact, no Paleozoic younger than Devonian.

In central and southern Florida, the Jurassic, Lower Cretaceous, Upper Cretaceous, and Tertiary formations are composed of limestones, dolomites, and anhydrites with minor exceptions such as thin beds of red sand in the Jurassic, some green brittle shale at the top of

"Present exploration is by seismograph, core drill, and concentrated drilling of deep tests . . . Currently there are approximately 12 major oil companies exploring this area by one or more of these methods, and there are 18 companies in the area."

the Lower Cretaceous, and a 30-ft. bed of salt below the Sunniland limestone in the Lower Cretaceous.

Beds in Alabama generally dip to the southwest changing to the south as they cross into the central part of the area and back to the southwest going into southern Florida. Horizons which produce oil here are the Sunniland limestone of Glen Rose age in the Lower Cretaceous at Sunniland and Forty Mile Bend fields, and the lower Tuscaloosa sand at the base of the Upper Cretaceous in Pollard and South Carlton fields. A small amount of oil is produced from upper Tuscaloosa sand in Pollard field. Potential producing horizons are the Eutaw or Eagle Ford sands in Alabama and in western and North Central Florida; the Jurassic sand and limestones of both Alabama and southern Florida; porous limestones and dolomites above and below the Sunniland limestone in the Lower Cretaceous in southern Florida; porous beds of the Upper Cretaceous in southern Florida, and one or two beds of Tertiary age in both Alabama and southern Florida.

Exploration

Although the search for oil in the southeastern states of Alabama, Georgia, and Florida began near the start of the century, it was not until the discovery of oil in southern Mississippi in 1939 that most of the major operators became actively interested in the southeastern states. Florida's first oil was found in 1943 by Humble at Sunniland, and Alabama's first oil field was discovered in 1944 by H. L. Hunt at Gilbertown. The next discovery was South Carlton in 1950, followed in 1952 by Pollard and in 1954 by the Forty Mile Bend field. The total number of producing wells, not counting Gilbertown field, amount to 59, with the total cumulative oil production being slightly more than 5 million barrels of oil as of April 1, 1954.

Exploration was at a high peak between 1945 and 1949 and again in late 1952 and all during 1953. These cycles of activity followed the discovery of oil fields. Generally, the areas receiving the most attention from major operators at present are the southern Alabama-western Florida region and the southern Florida area. A few wells have been drilled in southern and southeastern Georgia during the past year, but for the most part the areas of Georgia, eastern Alabama, and North Central Florida have had little recent exploration. Present exploration is by seismograph, core drill, and concentrated drilling of deep tests. Most of the area has been explored previously by gravity meter and magnetometer. Of interest is the seismograph, core drill, and concentrated drilling of deep tests. Of interest is the seismograph work now being done by Coastal Petroleum Co. in the waters off the west coast of Florida. Coastal, Magnolia Petroleum Co., and Gulf Oil Corp. own most of the offshore leases of Florida. Currently there are approximately 12 major oil companies exploring this area by one or more of the above methods, and there are 18 companies in the area.

Forecast

A forecast of the future of the petroleum industry in this area should be cautiously optimistic. Throughout, there are interesting structural and stratigraphic features which could produce great amounts of oil and gas. Some of the difficulties of exploring this large area involve both physical and economic considerations. For example, the high cost of drilling wells in southern Florida reduces the random wildcatting which has brought in many fields in other parts of the world. The difficulty of obtaining good seismograph records in the area has been one of the stumbling blocks in the way of additional discoveries in the future.

Through the years our knowledge of the geology of the area has steadily increased. This has resulted in a more skilled and scientific approach to the problems of exploration. A corresponding improvement of our ability or know-how in the drilling of the wells has cut the cost of exploratory tests tremendously. Unfavorable results in certain areas in the area have cut costs of leases but also have concentrated exploration in other places. These factors, together with the fact that three oil fields have been found in this area in the last 4 years, give reasons for optimism. It is believed that the foundation has been laid for a more effective method of exploration in southern Alabama, Georgia, and Florida and that in the future these southeastern states may comprise a major oil province.

CANADA

Red Deer Discovery Information Released

Details of three drill-stem tests run in the Viking sand at Imperial Oil, Ltd.'s, gas and oil discovery well in the Red Deer area of central Alberta were released by owner of the well. Initial drill-stem test flowed natural gas at rate slightly less than 2,000,000 cu. ft. daily, while last reported test flowed light-gravity crude oil to the surface.

The gas and oil discovery came at Imperial 5-5-39-26, Red Deer which is on LSD 5, 5-39-26w4, 4¾ miles northwest of the Cal-Standard 11-25 Joffree oil success, the most northwesterly Viking oil well in Joffre oil field, 5 miles northeast of Red Deer and 85 miles north-northwest of Calgary.

Initial Viking drill-stem test was run for 1 hour from 5,125 to 5,160 ft. There was a strong air blow, with natural gas reaching the surface in 2 minutes, at maximum rate of 1,930,000 cu. ft. daily. Mud sprayed in 40 minutes and pipe recovery was 550 ft. of gassy mud. First drill-stem test to yield oil was run from 5,162 to 5,177 ft. for 1 hour. There was a strong air blow, with gas to surface in 25 minutes, at maximum rate 140,000 cu. ft. daily, dying at end of the test. Pipe recovery consisted of 3,120 ft. of gassy oil and 30 ft. of mud.

The oil flow was recorded during a 1 hour and 40-minute test in the Viking section from 5,170 to 5,185 ft. Natural gas reached the surface in 7 minutes, at maximum rate of 175,000 cu. ft. daily, decreasing to a weak blow. Oil flowed in 1½ hours and when pipe was pulled out was found to contain 3,115 ft. of gassy oil and 30 ft. of drilling mud. Latest depth report placed the well at 5,248 ft., and crew was running string of production casing. No additional drill-stem tests have been released.

Woodbend area . . . An exploratory driller in tn the northwest Woodbend area that was carried down in search of D3 Devonian oil production is being plugged to the basal quartz where natural gas was encountered, after failing to find commercial production in the lower horizons.

The well, Union 14-31 Carson Woodbend, LSD 14, 31-51-26w4, is ¾ of a mile northnortheast of the Home 1 Woodbend abandonment and that same distance east-southeast of Imperial 2 Golden Spike dry hole. Previously basal quartz gas had been found at wells about 2½ miles to the southeast.

The well entered the basal quartz at 4,220 ft., or 1,907 ft. subsea (K.B. elevation 2,313 ft.), and first drill-stem test was run from 4,243-73 ft. for 1 hour. Natural gas flowed in 5 minutes at maximum rate 1,250,000 cu. ft. daily and recovery was 200 ft. of sulfurous gas-cut mud. One-hour test from 4,321-71 ft. gave up 3,100 ft. of salt water. A straddle-packer test in the section 4,273 to 4,321 ft. for 1 hour flowed natural gas at rate 6,000,000 cu. ft. daily, and there was no recovery.

Saskatchewan . . . Imperial Oil Ltd., at its Viking oil discovery in the Eureka area of southwest Saskatchewan, about 22 miles north of Kindersley, has pumped oil at the rate of 36.8 bbl. daily.

The discovery well, Imperial 6-35, Eureka, LSD 6, 35-31-23w3, is about 2½ miles northeast of Coleville area Banff sand heavy gravity oil production, 1½ miles east of Canada Southern 2 Eureka capped gas well, and about 14 miles east-northeast of Smiley-Dewar area Viking oil wells.

Hole had been taken down to 2,500 ft.,

an ACCO product

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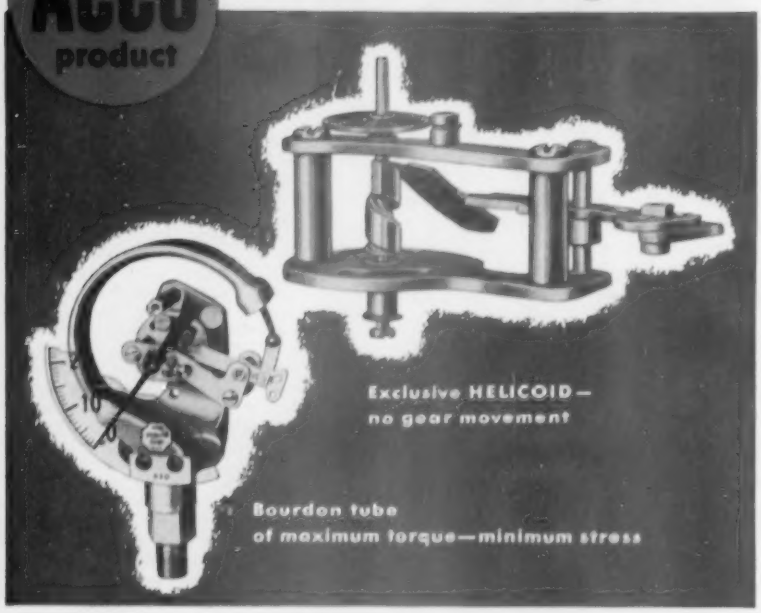

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and string of production casing was set at 2,402 ft., with 200 sacks of cement. The oil is coming from the open hole interval 2,403-2,412 ft. During swab tests run previous to installing the pump, the well made 12 bbl. in 4 hours; 35 bbl. in 12½ hours; and 35 bbl. in 12 hours. Pump testing is being continued at the well.

Joffre area . . . The California Standard Co., at its ¾-mile oil extension in the Joffre area of central Alberta, has opened up 26 ft. of Viking oil sand pay, with a large recovery of clean oil on the latest test. This venture about 10 miles east of Red Deer, ran five drill-stem tests in the pay sand, flowed on a pair, and has recorded sizable recoveries on the others.

The well, Cal Standard 11-25 Joffre, LSD 11, 25-38-26w4, the most northwesterly oil success in that field, on latest test of interval 5,086-91 ft., gave up 4,700 ft. of light oil, and flowed gas in 6 minutes at the rate of 158,000 cu. ft. per day, during the 70 minutes valve was open. Crew at last report had set 7 in. production casing to 5,139 ft., using 525 sacks of cement, and is currently waiting for the cement to harden.

EASTERN CANADA

Ontario . . . Drilling in Lake Erie, offshore from Port Alma in Romney Township, Kent County, Consolidated West Petroleum 11 has finished around 1,400 ft. with 2,743,000 cu. ft. open flow daily. The company's largest producer to date, the well was located 2 miles off shore in more than 50 ft. of water. 12 is being started as an offset to 11.

In York County, a test for water, located on the George Arnold farm near Unionville, 15 miles north of Toronto, has encountered a substantial gas flow at shallow depth. The well has been shut in pending systematic tests.

HUGOTON EMBAYMENT

Mississippian Discoveries Indicated in Meade-Seward

Ohio Oil Co. 1 Bond, 9 miles southeast of Kismet in NW NW SE 32-33s-30w, Meade County, Kansas, has showed for a Mississippian discovery.

Alladin Petroleum Corp. 1 Colvin, NE NW 15-35s-31w, miles east of Liberal in Seward County, has also showed for a Mississippian discovery. On a test at 6,338-6,454 ft., open 1 hour, it surfaced gas in 25 minutes at 120 M.c.f. per day.

Texas Panhandle Strawn Strike Gets Potential

A new Strawn gas discovery in Hansford County has been potentialed at United Producing Co. 4 Lola Jackson, 5 miles south of Hitchland and 3 miles southwest of Hitchland Pennsylvanian field.

The discovery flowed 14,100 M.c.f. of gas per day following fracture from perforations at 6,586-6,606 ft.

Gage Takn at East Sturgis Confirmation

The second producer in the East Sturgis oil producing area on the southeast flank of Keyes field in western Texas County, Oklahoma, has been completed at Cabot Carbon Co. 1 State of Oklahoma "D," SE NE SW 30-5n-19eCM.

The discovery flowed 720 bbl. of 39° to 41°-gravity oil per day through ⅝-in. choke from perforations at 4,271-77 ft. in the lower Purdy sand. The confirmation well is 2 locations south of the field discovery.

Northwest Greenwood Field Has Expansion Under Way

The northwest side of big Greenwood gas field in Morton County, Kansas, is enjoying a rapid expansion program.

Six wells are being drilled, tested, or preparing to test in the area between the field proper and the extension region. Colorado Interstate and Superior Oil Co. 1 Dreyer, 5-32s-43w, is the center of the activity. It potentialed for 4,500 M.c.f. of gas per day. There are three wells in the area currently drilling.

Deep Texas County Test Recovers Marmaton Oil

Marmaton oil has been recovered on drill-stem test at an important deep wildcat inside Hugoton gas field in Texas County, Oklahoma.

Oceanic Oil Co. 1-A Swinger, NW NE 5-5n-16eCM, 9 miles northwest of Hooker, has indicated pay on test at 5,366-68 ft. Recovery was 1,900 ft. of free oil, 180 ft. of heavily oil and water emulsion-cut mud, and 905 ft. of salt water.

Grand Valley field . . . United Producing Co. 1 Harrison, NW SE 25-2n-19eCM, Texas County, is a successful 1-mile north outpost to the 1 Sillars, new gas discovery of Grand Valley field.

The Harrison flowed 57,000 M.c.f. of gas per day from Morrow perforations at 6,755-80 ft. The confirmation success is 4 miles north of Camrick field production.

MICHIGAN

Flowing at a rate of more than 50 bbl. of oil an hour from the Trenton after acidizations, Edward Torosian 1 H. Balko et al, NW SE SW 36-1n-7e, Lyon Township, Oakland County, was being completed as the first major extender of Northville Trenton oil pool and as the third commercial oil producer in the pool.

Torosian's extension producer is the first oil well to be completed in Oakland County, and is located over 1 mile northwest of the original two oil wells in Northville pool—both of which were drilled by W. C. Taggart.

The 1 H. Balko was drilled to 4,746 ft., total depth, after top of Trenton was logged at 4,406 ft. Trenton dolomite pays were perforated with a total of 99 shots—60 shots at 4,560-82 ft., and 30 shots at 4,475-85 ft.

After initial acidization with 1,500 gal. of regular and 500 gal. of mud acid, the Torosian extension well flowed back about 150 bbl. of net oil in 8 hours. During first 18 hours, about 315 bbl. of oil had been flowed to storage and well was continuing to flow at a rate of more than 25 bbl. an hour. During the first 24 to 36 hours well had produced about 700 bbl. into the 4,210-bbl. tanks on the lease and more tankage was being erected. Following a second acid treatment with 3,000 gal., flow rate was increased to over 50 bbl. an hour. The Torosian 1 H. Balko, et al, appeared to be on a par with the 1 LeMaster discovery well, on the basis of these early flow tests. This well, it appeared, will reactivate interest and drilling action in the Northville area. Although work has been progressing there, the failure of several tests to log oil pays, although gas has shown in many of the completions by those other than W. C. Taggart, activity was about down to a standstill as far as new starts were concerned when this newest stimulus popped up on the horizon.

APPALACHIAN AREA

WEST VIRGINIA

Dry Fork district, Randolph County, Columbian Carbon Co., has started drilling operations in No. 1-1202 United States of America Tract 71 rank wildcat, elevation 3,036 ft., Horton Quadrangle, 2.97 miles south of latitude 38 degrees 50 minutes and 1.16 miles west of longitude 79 degrees 40 minutes. Otter district, Braxton County, Otter Gas Co., 1 Hugh Beckett deep test, elevation 923 ft., had a show of gas testing 67,000 cu. ft., at 6,660 ft., in the Oriskany sand and is shut down at 6,825 ft. Anthony Creek district, Greenbrier County, United Fuel Gas Co., 8240 M. J. Alderman penetrated the Oriskany sand 1,056-1,102 ft., and drilling is at 1,117 ft. Beaver Pond district, Mercer County, United Fuel Gas Co., 8010 Edward Combs, elevation 2,756 ft., is drilling at 2,207 ft., and in Plymouth district, 1 J. B. Eads, elevation 1,764 ft. shut down at 787 ft.

OHIO

An addition to Greer pool in Jefferson Township, Knox County, was completed by the Mutual Oil and Gas Co. on 2 Stitzline, Section 21. Clinton at 3,076-3,123 ft., with two pays, made 175 bbl. oil and 1,000,000 cu. ft. gas in a 24 hour test after fracturing.

Preston Oil 4 Blanche Foucht, Section 18, Hopewell Township, Perry County, produced 242 bbl. in a 24 hour test taken 7 days after fracturing. Clinton sand was logged at 2,794-2,815 ft.

A ¾-mile step-out to Hanover pool in Licking County was brought-in by Waverly Oil Works on 5 M. J. Fleming, Lot 13. Clinton at 2,837-2,873 ft. made 5 bbl. natural and 70 bbl. in 24 hours after fracturing.

PENNSYLVANIA

Monroe Township, Bedford County, Southwest Pennsylvania, John Galey 1 Donald H. Miller, is drilling at 4,750 ft. Salt Lick Township, Fayette County, Mid Atlantic Oil & Gas Co. 1 Adolph Dupre, is at 3,825 ft.

KANSAS

Casing Run at Indicated Graham County Strike

Mid-Continent Petroleum Corp. is preparing to perforate 1 Dietz, SW SW NW 8-10s-23w, wildcat 2 miles northwest of Happy pool in Graham County.

The southern Graham County wildcat recovered 960 ft. of gas and 220 ft. of gassy muddy oil on drill-stem test of the Lansing at 3,878-95 ft.

Casting Set at New McPherson Discovery

Testing is due at an indicated Mississippian discovery ¾ mile northeast of Holle-Nikkel pool in McPherson County.

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28-21s-3w, south-central McPherson, recovered 560 ft. of free oil, 100 ft. of oil and gas-cut mud and 120 ft. of water on drill-stem test in lime at 3,170-3,205 ft.

LOUISIANA

NORTH LOUISIANA

New Smackover Oil Field Finaled in Webster Parish

Hunt Oil Co. and Associates have completed 1 Ardis C. Burns et al, 9-23n-9w, Webster Parish, flowing 248 bbl. of 47°-gravity oil per day through 12/64-in. choke.

Production is from the Smackover lime through perforations at 11,065-102 and 11,112-32 ft. The discovery is about halfway between three deep abandonments.

SOUTH LOUISIANA

Second Richbend Producer Opens Shallower Oil Sand

Union Producing Co. has completed its 1 Moseley as a new-pay discovery and second producer in the Richbend sector of the College Point-St. James area, in St. James Parish.

The new well, south offset to Union Oil Co.'s discovery well, 1 Karstein, completed last May, flowed at the rate of 249 bbl. of 37.5°-gravity oil per day through 7/64-in. choke. It had pressure of 1,940 psi., and flowed with gas-oil ratio of 790 cu. ft. per barrel.

Producing sand, perforated at 10,647-53 ft., is approximately 275 ft. shallower than the discovery well's pay, perforated at 10,922-44 ft. Union Producing Co.'s well, drilled to 11,225 ft., tested salt water in the deeper pay.

Since completion of the discovery well, Union Oil Co. has drilled a dry hole, its 2 Karstein, a location west of the initial producer.

OKLAHOMA

Southeast Sunflower Field Extended Half-Mile South

Kingwood Oil Co. 1 Oscar Green, NW NW NE 33-14n-2e, Lincoln County, has extended Southeast Sunflower pool, one of the fastest growing pools in Oklahoma, ½ mile to the south.

The extension well flowed 45 bbl. of new oil in 3 hours from perforations in the Checkerboard sand at 3,803-14 ft. after fracturing. The well is shut-in for tankage.

Well Added to Southeast Bradley Pool in Grady

British-American Oil Producing Co. 3 Burkes, C NE SE 12-4n-5w, on the east side of Grady County's Southeast Bradley field, flowed 235 bbl. of oil natural in 24 hours on 16/64-in. choke. Production is from the Springer sand through perforations at 9,129-98 ft. Testing continues.

Third Pay Tested At Deep Grady Well

Phillips Petroleum Co. has successfully tested a third flowing pay formation of its 1 Steve, new Grady County, Oklahoma, multi-zone discovery well.

On this test the well flowed 48.1°-gravity oil at the rate of 327 bbl. per day through a small choke from perforations in the third Bromide formation between 12,885-973 and 13,002-050 ft. Gas-oil ratio was 3,768:1.

The new well previously flowed through small chokes at the rates of 411 bbl. of oil per day from perforations in the Oil Creek formation between 13,735-804 ft. and 728 bbl. of oil per day from basal McLish perforations between 13,294-325 ft. This is the first production in the area from the Oil Creek, McLish and third Bromide formations.

Phillips will next perforate and test the first and second Bromide formations which yielded substantial quantities of oil on drill-stem tests. Drilling of two more deep test wells near the discovery well is proceeding, and the company is moving in equipment to start another test a mile northeast.

The 1 Steve is located in the SE NE 35-5n-5w, 1½ miles southeast of Bradley, Oklahoma.

First Simpson Strike of Year On Northern Shelf

The northern shelf of the Anadarko basin gots its first Simpson discovery of 1954 at Carter Oil Co. et al 1 Hodges heirs, Grant County discovery in NE NW NW 23-26n-5w.

The operators will take a drill-stem test at 5,802-13 ft. after the wildcat flowed oil at the estimated rate of 5 bbl. hourly on test at 5,758-74 ft. Oil is 43.8°-gravity. Recovery was 780 ft. of free oil with no water.

The new Simpson strike, 2 miles northwest

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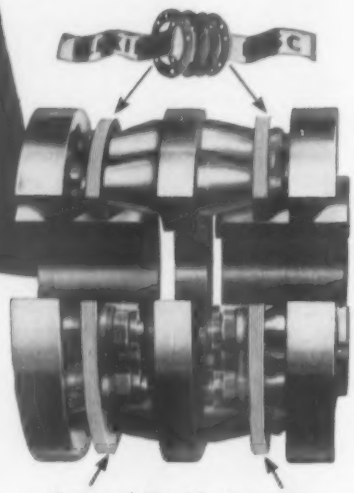

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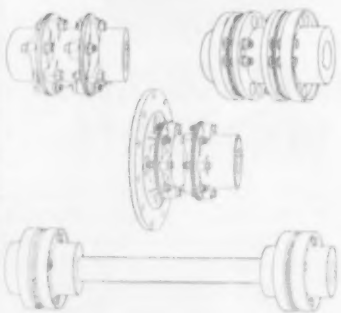

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of Rich Valley pool, is the first such strike in this section of the northern Anadarko basin shelf this year. Simpson exploration in this province was one of the drilling highlights of 1953 in Oklahoma and Kansas. Last year on the northern border of the state in Grant County Union Oil Co. of California opened a good Simpson pool at North Jarvis. The remote wildcat flowed 311 bbl. of 42°-gravity oil per day on ½-in. choke on its first 24-hour production test. North Jarvis is 15 miles southwest of nearest Simpson production in Caldwell field, Kansas, and about 25 miles northwest of Oklahoma's East Pond Creek and Rich Valley Simpson fields.

Last year Kingman County, Kansas had a big Simpson oil discovery at Orsemus pool. The Texas Co. discovery was completed with a bomb potential of 1,901 bbl. of oil per day. This pool is at the northern end of the indicated vast Simpson producing area bounded on the east by the Nemaha granite ridge, on the south by El Reno Simpson-Wilcox wet gas field (another 1953 strike), and on the west by Yellowstone pool in Woods County (Oklahoma's biggest strike last year).

New Oil Pool Indicated In Grady's Bradley Area

Gulf Oil Corp. et al 1 Costello, NE SE 14-5n-5w, is drilling ahead at 11,462 ft. after a successful drill-stem test in the Viola lime at 11,395-460 ft. for an indicated new oil pool in the hot Bradley area of Grady County.

Recovery in addition to water cushion was 300 ft. of oil and 430 ft. of gas-cut mud. The possible strike is located 1¾ miles southwest of Northeast Bradley pool.

Bradley pool extension . . . Phillips Petroleum Co. is testing in the third Bromide sand, the 1 Steve's third producing zone in C SE NE 35-5n-5w.

The state's deepest producer already has production in the McLish and Oil Creek sands.

Garvin County . . . A big well is completing at Republic Natural Gas Co. 1 Williams, Eola pool, SE SE SW 1-1n-3w. The well flowed 88 bbl. of oil hourly for 4 hours on 32/64-in. choke from the McLish at 10,810-850 ft. Daily rate is 2,112 bbl. It also flowed 79 bbl. of oil hourly from the Bromide through perforations at 10,378-84 ft. From basal Bromide perforations at 10,340-356 ft. the 5,251-bbl. per day well flowed 1,028 bbl. of oil in 19.8 hours.

ILLINOIS

New Illinois Mid-Continent is cleaning out to test the Benoist sand at 3,097-3,132 ft. and the Aux Vases sand at 3,230-60 and the Rosiclare topped at 3,335 ft. at 1 Harris-Woods Community, 18-2s-10e, 4 miles southwest of Albion in Edwards County.

Oil Management, Inc. has set casing through the O'Hara lime at 2,835-45 ft. at 2 Smith, 29-5s-3e, 3 miles north of Benton in Franklin County. Recovery on a drill-stem test was 2,120 ft. of clean oil, 60 ft. of mud-cut oil with no water. The discovery is ½ mile from Cypress production and more than 2 miles away from O'Hara wells.

Jim Dean, Jake Hallowell and Southern Development Co. have what may be the first production in the Harrisburg area of Saline County. The 1 Taylor, 8-9s-6e, has oil saturation at 2,502-20 and Aux Vases at 2,616-24 ft.

TEXAS

TEXAS GULF COAST

Extension Well Uncovers New Pay at Sabine Tram

Production in the Sabine Tram area, Newton County, has been extended approximately 3,200 ft. farther to the west with a new-pay discovery by Christi, Mitchell & Mitchell at their 2 Hankamer, in the J. C. Patton Survey.

The extension well flowed at the rate of 100 bbl. of oil per day while cleaning through 8/64-in. choke under pressure of 400 psi. The new pay zone, in Yegua sand, perforated at 8,197-8,207 ft., is the deepest in the area. Nearest well, the operators' 1 Hankamer, completed last November, produces from Yegua sand at 7,736½-42½ ft.

Second Kain Area Well Opens Deeper Gas Sand

Union Producing Co.'s newly completed extension and new-pay discovery well in the Kain area, 11 miles southeast of Matagorda, in Matagorda County, is rated good for 10,000,000 cu. ft. of gas daily on open-flow potential gage.

The well, 1 State Tract 100, in East Matagorda Bay, is 1,400 ft. north of Shell Oil Co.'s gas-condensate discovery well, 1 Kain, completed last August. Its new pay

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is in Miocene sand, perforated at 6,649-55 ft. Shell's well produces from Miocene sand at 6,015-25 ft.

The area is on the bay side of Matagorda Peninsula, Shell's acreage being on shore and Union's in the bay. Union has drilled two dry holes, one to the west of Shell's discovery well, and the other about ¾ mile northeast of the new gasser.

Boling Gets New Oil Pay

A new oil-producing sand has been opened on the south flank of Boling dome, in Wharton County. Discovery well, M. T. Halbouty 2 Gary-Hogg, in S. F. Austin Survey, flowed 103.65 bbl. of 30°-gravity oil per day through 10/64-in. choke with gas-oil ratio of 500 cu. ft. per barrel and pressure of 190 psi. New pay is perforated at 3,292-3,310 ft.

EAST TEXAS

First Well On Johnson Fee in Neches Field

The first oil well on Neches field's Johnson land, Anderson County, has been completed flowing 158 bbl. of oil from the sub-Clarksville pay per day. Humble Oil & Refining Co.'s well is producing from perforations at 4,630-40 ft. on ¼-in. choke.

NORTH TEXAS

Grayson Gets New Pennsylvanian Field

A new Pennsylvanian oil field has been opened in the Whitesboro area of Grayson County at Superior Oil Co. 1-A Scheid.

The well pumped 95 bbl. of 33.5°-gravity oil per day through perforations at 5,242-49 ft. The field has been named Whitesboro No. 25 Sand.

Strawn Confirmed At Noodle Middle

Elm Oil Co. has confirmed Strawn production in Noodle Middle Strawn field, Jones County.

The 1 C. P. Hodges flowed 146 bbl. of oil through 15/64-in. choke through perforations at 4,927-30 ft. Gravity is 44°. The discovery is located 10 miles northwest of Merkel in Section 32, Block 18, Texas and Pacific.

Strawn Discovery Finaled In Archer County Area

A new Strawn field has been opened in Archer County at Bailey & Lofton 1 Ball, southeastern part of the county, 3 miles north of Antelope.

The well pumped 83 bbl. of 40°-gravity oil on 24-hour test through perforations at 3,021-30 ft. The well is 1¼ miles north of Tex-Am field in the A. Nunley Survey A-320, Block 1.

Northwest Denton Has Two New-Pay Strikes

Bolivar field has a new pay at Gibson Oil Corp. 13-A Forester. The well flowed 56 bbl. of 42°-gravity oil on ¼-in. choke through perforations at 1,711-19 ft. Regular pay in the area is at 1,900 ft.

In South Bolivar field C. L. Jenkins and I. R. McQueen et al 2 Rogers was completed on pump for 21 bbl. of 34°-gravity oil per day through perforations at 1,490-506 ft.

New Pay Opened In Grayson County

Seitz, Comegys & Seitz 2 Jamison, Mackoy Strawn field, 3 miles south of Whitesboro in western Grayson County, opened a new shallow pay in the field.

The flow in 24 hours was 122 bbl. of oil on 18/64-in. choke. Gas-oil ratio is 200:1. Gravity is 34°. Perforations are at 4,111-21 ft. Regular field pay is about 5,100 ft.

Grace Fowler Field Gets Third Producer

Young County's Grace Fowler field, 10 miles northeast of Graham, has its third oil well at G. H. Brown, Jr. 1 Oatman.

The well pumped 116 bbl. of 42°-gravity oil per day on official gage. Pay was called at 2,791 ft. Production is through perforations at 2,793-97 ft. The well is 800 ft. northwest of Grace & Fowler's 1 Prather. The discovery well was finaled for 189 bbl. of oil per day from perforations at 2,800-10 ft.

Stevens Discovery Takes Potential

A small pumper was completed in Stephens County, 6 miles northeast of Caddo. The John H. Wilson 1-B Pitzer made 20 bbl. of 42°-gravity oil per day through shallow perforations at 1,485-1,503 ft.

Throckmorton . . . Caddo lime production is indicated at a wildcat 10 miles east of Throckmorton at Warren Petroleum Corp. 1 Greathouse.

Good shows were found on two drill-stem tests. Recovery was 360 ft. of oil on test of the interval 4,090-4100 ft. A test at 4,100-120 ft. recovered 1,000 ft. of oil and 10 ft. of gas-cut mud. The strike is located in Section 2146, TE&L Sur. A-556.

Taylor County . . . In new White field Gogle Bros. and O. B. Stephens have a new good well at 1 Price. The well flowed 366 bbl. of 39.9°-gravity oil per day through Tannehill sand perforations at 2,734-42 ft. Gage was on 24/64-in. choke.

WEST TEXAS

Upton County Discovery Gets Gas-Condensate

Anderson-Prichard Oil Corp. 1 Windham, southwest offset to The Texas Co. 1 Graf, gas-distillate discovery well in western Upton County, got a good flow of distillate and gas volume from the Pennsylvanian. Testing continues.

The well flowed 41 bbl. of distillate the first hour of gage from perforations at 9,782-94 ft. after acidization. It flowed 3,780 M.c.f. of gas per day. The well made 25 bbl. of distillate and 3,875 M.c.f. of gas per day during the second hour of testing.

The discovery is in Block D, CCSD&RGNG Survey, 16 miles northwest of Rankin.

New Oil Swabbed at Lamb County Prospect

The Texas Co. and Seaboard Oil Co. 1 Kirk, 4 miles northwest of Anton in Lamb County, swabbed new oil from the Clear Fork for an indicated commercial discovery.

A total of 243 bbl. of fluid being 220 bbl. of load and acid water and 23 bbl. new oil was recovered by swabbing for 11 hours of reacidized perforations at 6,414-66 ft. The wildcat is still testing and swabbing. It is located in Section 6, Block 1, R. M. Thompson Survey.

Second Distillate Well Finaling in Ward County

Magnolia Petroleum Co. 1 U-Tex Lease "E", ½ mile south of a recent Delaware sand gas-condensate discovery in northern Ward County, has been shut in after taking initial gage.

The discovery flowed 17 bbl. of distillate on 16/64-in. choke in 16 hours. Gas measured 1,680 M.c.f. per day from perforations in the Delaware sand at 4,985-5,000 ft. Gravity of the distillate is 62.2°. Gas-oil ratio is 67,500:1.

Deep Rock Ellenburger Field Well Completed by Lowe

Ralph Lowe has completed the 1 Sloan, his third big Ellenburger discovery this year in the area west of Andrews in Andrews County, for an initial potential of 3,006 bbl. of 43.8°-gravity oil daily.

Production was from perforations at 12,260-320 ft. through ¾-in. choke. The big well is located in Section 4, Block A-43, Public School Land Survey, 5 miles southwest of Andrews.

Reagan Wildcat Testing Gas-Distillate Shows

Kerr-McGee Oil Industries, Inc. 1 University "C", just east of Santa Rita in Reagan County, took a drill-stem test in the Silurian and Fusselman from 11,672-790 ft. Recovery was 3,540 ft. of gas in the drill pipe, 1,600 ft. of heavily gas and distillate-cut water blanket, and 230 ft. of heavily gas and distillate-cut salty mud.

Operator is drilling ahead at 11,838 ft. The wildcat is located in Section 35, Block 9, University Lands Survey.

Midland County . . . A good show of oil and gas from the Devonian was recovered on a drill-stem test at British American Oil Producing Co. et al 1 Roy Parks, Jr.

The wildcat, 1½ miles south of Headlee field on the Midland-Ector County line, topped the Devonian at 11,421 ft. The drill-stem test was taken at 11,505-681 ft. Recovery in the drill pipe was 1,005 ft. of heavily gas-cut water blanket, 1,350 ft. of heavily gas-cut mud, and 90 ft. of oil-cut mud, 10 per cent oil. The prospect is located in Section 28, Block 41, T-2-S, Texas & Pacific Railroad Survey.

Andrews County . . . Ralph Lowe 1 Sloan gaged 751 bbl. of oil in 6 hours through ¾-in. choke. This is the operator's third Ellenburger strike in the area west of Andrews this year.

The discovery is located 1 mile south of the 1 Southland Royalty . . . 3 miles south of 1 Deep Rock. The three wells are believed to be on the same deep Ellenburger structure. Location of the 1 Sloan is in NWc Section 4, Block A-43.

Runnels County . . . Miami Operating Co. completed 2-A H. T. Lindeman with a flowing potential of 330 bbl. of 40°-gravity oil on a daily test.

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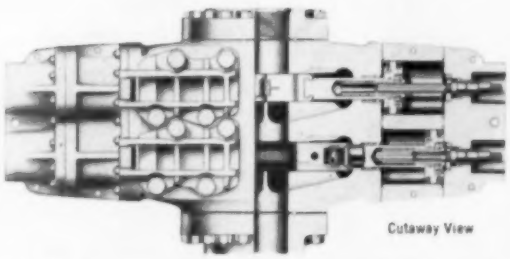

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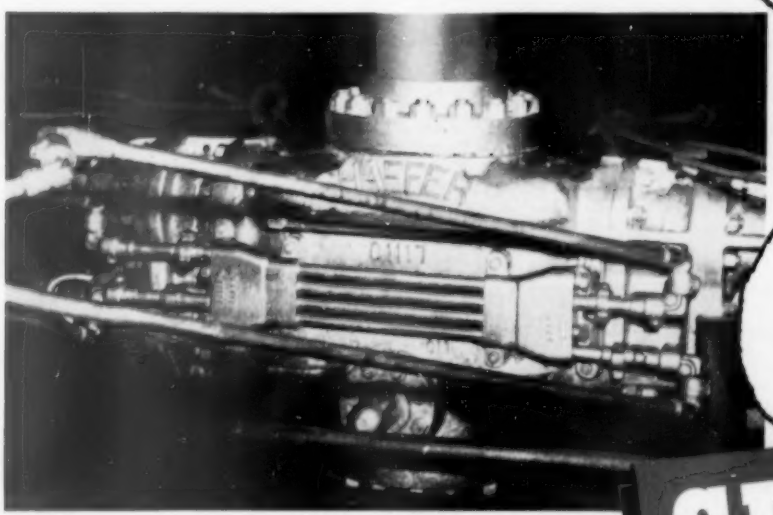

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through an 18/64-in. choke. It is located 7 miles southwest of Crews. Location is Block 262, Austin & Williams Survey.

Reeves Deep Wildcat to Get Ellenburger Tests

An important deep hole in the Delaware basin, Gulf Oil Corp. 1 Toyah unit, will drill to about 14,780 ft. and take a drill-stem test. Ellenburger was topped at 14,712 ft.

The wildcat is 7 miles northeast of Toyah. The closely-watched test has found some gas in the Devonian section. The Ordovician is the zone that was hoped to produce.

Pennsylvanian Lime Oil Found at Scurry Wildcat

An eastern Scurry County wildcat, the Sunray Oil Corp. 1 Criswell, 10 miles west of Rotan, found free oil on a drill-stem test of the Pennsylvanian lime at 6,287-96 ft.

Recovery was 90 ft. of heavily oil and gas-cut mud plus 180 ft. of free oil. The wildcat is located in Section 212, Block 2, H&TC Survey.

Devonian Strike in Andrews

Delbasin Oil Corp. et al 1 Armstrong et al, south offset to Hunt Oil Co. 1 White, northern Andrews County discovery well, found free Devonian oil on a drill-stem test at 11,327-567 ft.

Recovery on the test was 6,257 ft. of gas, 1,242 ft. of free oil, 60 ft. of heavily mud-cut oil, 93 ft. of heavily oil and gas-cut water blanket, 1,575 ft. of gas and oil-cut water blanket, 93 ft. of heavily oil and gas-cut mud, 114 ft. of gas and mud-cut oil and 233 ft. of very heavily mud-cut oil. Another test is being taken at 11,566-617 ft.

The discovery is in Section 18, Block A-34, Public School Lands Survey.

SOUTHWEST TEXAS

Austin Chalk Productive In Frio County Discovery

Austin Chalk has been found productive in a wildcat test located 2½ miles southwest of Pearsall, in Frio County. The test, 1 Woodward, drilled by Drilling & Exploration, Inc., produced at the rate of 3 bbl. of oil per hour by swabbing. It will be completed on the pump. Top of the Austin Chalk is 5,510 ft. Hole is open below 5,520 ft. to 5,899 ft., total depth. Location is northwest of production in Pearsall field.

New Oil Pay Opened in San Miguel Creek Area

Humble Oil & Refining Co. has completed its second well in San Miguel Creek field, northern McMullen County, as an oil producer in sand at 5,741-59 ft., a new pay zone for the field.

The new well, 1-B Gubbels, good for 256 bbl. of 29°-gravity oil per day through ⅝-in. choke, is a half mile southwest of the company's initial well, completed last year with a potential flow of 100,000,000 cu. ft. of gas daily from sand at 10,149-82 ft.

The second well was drilled to 11,010 ft. but failed to find the first well's productive sands, and was plugged back to the 5,700-ft. oil sand.

One other well has been completed in the area, discovered by Atlantic Refining Co. in 1948. It is a marginal oil producer in a 5,400-ft. sand. Its location is 3,500 ft. northwest of Humble's large gasser.

New Gas-Condensate Area Opened in Aransas County

A new gas-condensate producing area, located 5 miles northeast of Aransas Pass and 2½ miles northeast of the old Aransas Pass field, in Aransas County, has been opened by Atlantic Refining Co. It has been designated as East Aransas Pass field.

The discovery well, 1 Barber, completed the past week, flowed at the rate of 2,800,000 cu. ft. of gas per day with gas-condensate ratio of 50,300 cu. ft. per barrel. Shut in, the well's pressure gaged 2,576 psi. Gravity of the condensate was 59.7°.

Production is from Marginulina sand, opposite which casing is perforated at 7,014-22 ft. and 7,032-36 ft. Hole was drilled to 10,000 ft.

WEST CENTRAL TEXAS

Flush Jones Strike Gets Flippen Production

A flush Flippen sand producer is testing at the rate of 18 bbl. of oil per hour from open hole at 2,393-2,405 ft. 1½ miles north of production in Section 13, Block 1, T&NO Survey, Jones County.

J. W. Geihle et al 1 White will complete the well, formerly operated by Jack Stroube.

Callahan Gets Hope Sand Oil Discovery

Northeastern Callahan County has a new Hope sand pool at Neaves Petroleum Developments et al 1-A Jackson, 6½ miles northeast of Baird in Section 16, ETRR Survey.

The well made 256 bbl. of 38°-gravity oil on potential test in 24 hours. Perforations are at 1,194-99 ft. Neaves Hope is the name requested for the new field. A west offset will be drilled at 2-A Jackson.

Cooke County Confirmation Completed by Concho

Concho Petroleum Co. et al 1 William Millham, eastern Cooke County Strawn confirmation, has been completed on a 24-hour potential test flowing 226 bbl. of 36°-gravity oil on ¾-in. choke.

The well is 2 miles southwest of Callisburg and is the confirmation to 1 Steed. Pay is at 4,036 ft. Perforations are at 4,036-38 and 4,042-60 ft.

Cambrian Well Added At North Dora Field

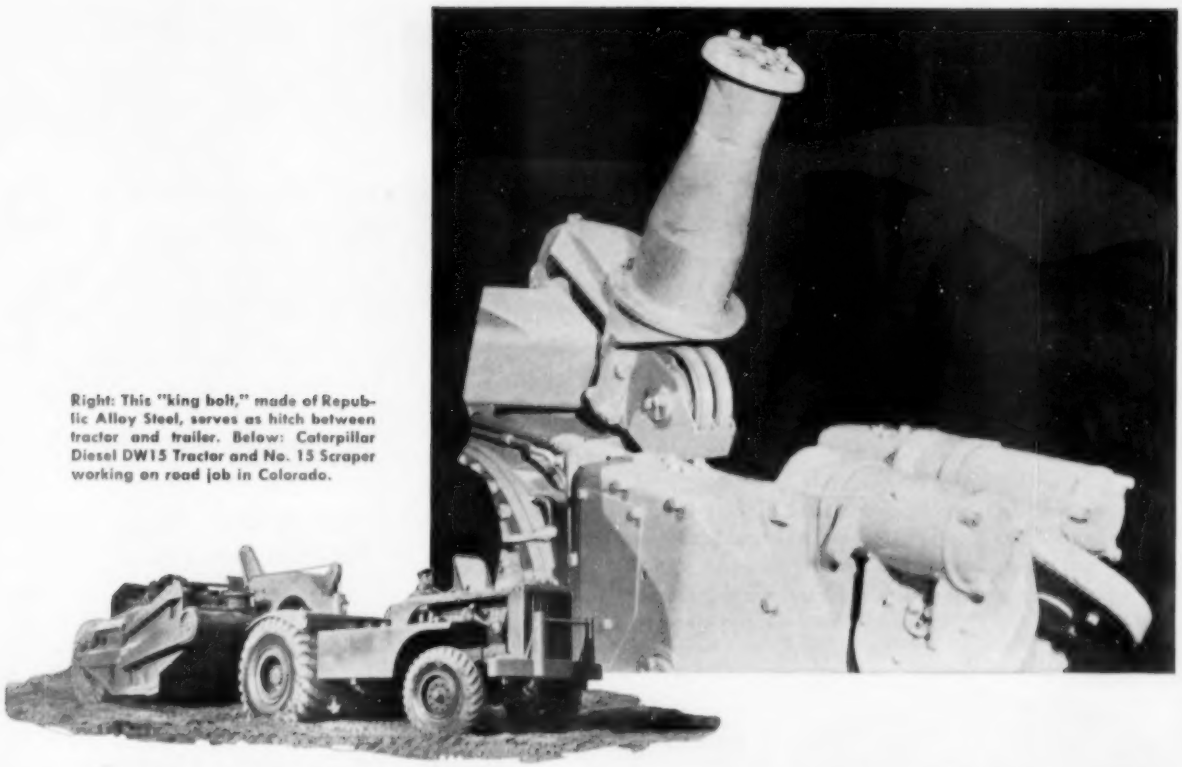
North Dora field has a new Cambrian producer at Skelly Oil Co. 8-P Boyd. It was completed flowing 1,920 bbl. of oil per day through choke. Production is from perforations at 5,952-96 ft.

NEW MEXICO

SOUTHEAST NEW MEXICO

Eddy Wildcat Gets More Pennsylvanian Showings

Great Western Drilling Co. 1 Grayburg Unit, northeastern Eddy County wildcat, has



Right: This "king bolt," made of Republic Alloy Steel, serves as hitch between tractor and trailer. Below: Caterpillar Diesel DW15 Tractor and No. 15 Scraper working on road job in Colorado.

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found more Pennsylvanian lime oil shows in a core and will drill-stem test at total depth of 9,140 ft.

Recovery on a core from 9,134-49 ft. was 15 ft. of lime and shale, oil shows in the top 2 ft. A drill-stem test at 9,097-9,134 ft. got 450 ft. of mud-cut oil of 41.1°-gravity.

Gas Flow Continues at Roosevelt Prospect

In Roosevelt County east of the Bledsoe area along the state line Shell Oil Co. 1 Bluitt-Federal, NW NE 14-8s-37e, gaged 1,600 M.c.f. of gas per day on ½-in. choke on its fourth day of testing in the San Andres lime. The wildcat is at plugged back depth of 4,600 ft.

CALIFORNIA

Yolo Wildcat May Result in Gas Find

A wildcat drilled by Shell Oil Co. 10 miles west of Dunnigan Hills gas field in Yolo County may result in a new gas find. Labeled 4X-11 Kingsbury, the test was drilled to 2,895 ft. Favorable shows led to the setting of 7-in. casing at 2,878 ft. Location of the test is in 11-11n-3w, in the Rumsey Hills area.

Carrizo Plains Wildcat Staked by Texas Co.

The Texas Co. was preparing to drill a 6,000-ft. test in the Carrizo Plains area of San Luis Obispo County, about 10 miles northeast of Cuyama Valley oil production. Site is in 12-11n-26w, where a 2,322-ft. dry hole was drilled about 30 years ago.

Designated 1 Travers, the test is about 10 miles southeast of a 7,201-ft. test abandoned late in July by E. C. Von Glahn Associates. This test, 1 Washburn, was in 36-32s-20e. It encountered oil sands but found them too tight to be productive.

Offshore Test Nearing 9,000 Ft.

The island-located test being drilled by Monterey Oil Co. 1½ miles offshore from Seal Beach was below 8,850 ft. in its search for basement. Drilled as a "no-dope" hole, other than depth, the exploratory test will do much to show whether or not Wilmington oil sands are present there, some 4½ miles southeast of present developed limits. At least two other tests will be drilled from the earth-filled, concrete-capped drilling island.

Oxnard Find Being Recompleted

Lloyd Corp., Ltd., was in process of recompleting 1 Livingston in Oxnard field, Ventura County, which in March was completed as the 600-bbl. discovery well in a 9,987-10,022 ft. basal Sespe sand. To test a shallower sand, the operator perforated the 7-in. casing at 9,575 ft. with four shots. When the zone produced oil an undisclosed volume hole was cleaned out to bottom so that the well could be completed in both pays.

ROCKY MOUNTAIN

WYOMING

Grieve Unit Discovery Finds Oil In Third Zone

Forest Oil Co. recovered oil at the rate of 1,215 bbl. per day on test of the interval 6,768-80 ft. at 1 Morton 22-1, NE SE NW 22-32n-85w, Natrona County. The test is the third to recover oil at rates from 60 to 100 bbl. per hour. The formation has been identified only as a Cretaceous sand. Cretaceous sands are productive at West Poison Spider and at Fish Creek through the general area. Forest Oil is reported drilling ahead below 6,780 ft. with more than 68 ft. of apparently productive saturation established.

Sweetwater County Wildcat Tests Mesavarde Gas

Mountain Fuel Supply Co. recovered gas at the rate of approximately 10,000 M.c.f. per day from Mesaverde at 3 Unit, C NE SW 3-12n-101w, in the Canyon Creek Unit, Sweetwater County. Recovery was from the interval 5,460-5,522 ft. Projected depth is about 6,500 ft. with the operator drilling ahead at last report. Previous wells in the unit have had Mesaverde shows, and the wildcat is about 12 miles east of Stanolind's oil and gas production in the Middle Mountain area.

Tip Top Area Test Finds Gas

General Petroleum Corp recovered gas at the rate of 4,250 M.c.f. per day on test of 26-X-12 Tip Top, SE NW SW 12-28n-11w, Sublette County. Test was of the zone 5,892-6,090 ft. Tool was open 2 hours, 47 minutes, and pipe recovery was 560 ft. of gas-cut mud. The well is about 1 mile southeast of previous oil production in the unit.

Park County Tensleep Discovery Flowing

Mule Creek Oil Co. of Billings has reported its 1 Big Polecat Unit, E½ SE SW 16-57n-98w, in the Big Polecat area, Park County flowing without reported gage. The well penetrated about 125 ft. of Tensleep sand, apparently productive, and made as much as 2,000 ft. of oil on drill-stem tests of zones within Tensleep. Casing was landed at 5,569 ft., and perforated in selected zones in the interval 5,362-5,512 ft.

MONTANA

Madison Oil Recovered At Cabin Creek

Shell Oil Co. recovered 2,940 ft. of oil on 2½ hour drill-stem test of Mission Canyon at 41-29 Unit, C NE NE 29-10n-58e, in the Cabin Creek area of Fallon County. Test was of the zone 7,273-7-325 ft. Recovery in pipe was 900 ft. of gassy, oily mud with oil content of 10 to 40 per cent. Previous completions in this field have been in Ordovician or Silurian despite previous Mission Canyon recoveries of some importance.

State Activity Turns Upward

During the past week a total of 21 new locations were announced in Montana. Of

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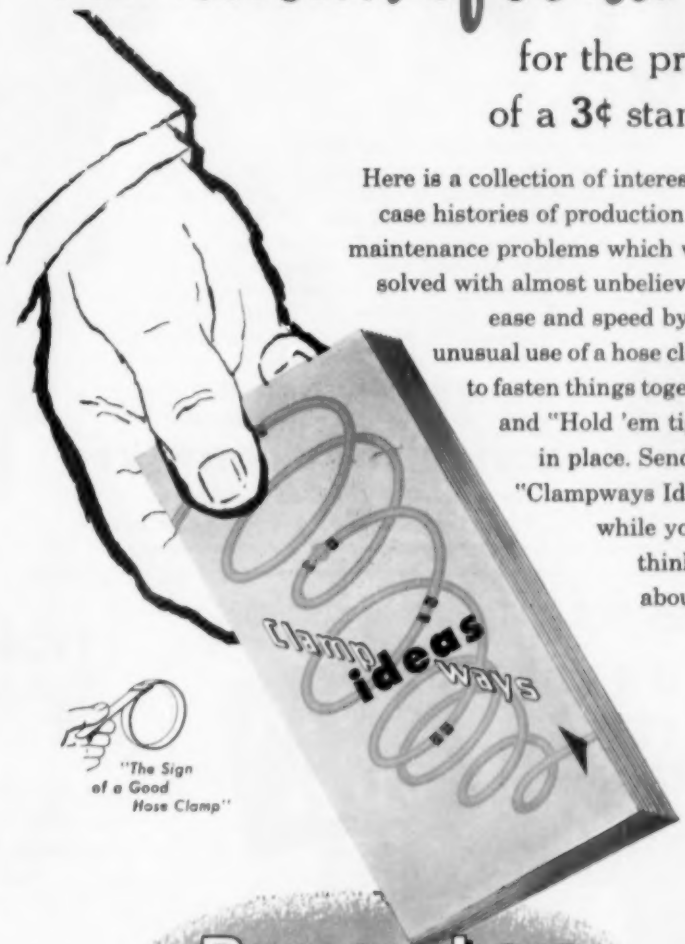

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THE OIL AND GAS JOURNAL

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these, nine were wildcats. The week is the best for the state in some time from the point of view of new locations made. Wildcats were staked in Beaverhead, Big Horn, Blaine, Fallon, Cascade, Fergus, Hill, Glacier, Stillwater and Valley counties. The increase in activity is at least partially credited to recent Glacier County discoveries although definite results have not been reported from discoveries in lower Mississippian in that county.

UTAH

New Gas Discovery Reported

International Development and Drilling Co. had an estimated 5,000 to 7,000 M.c.f. per day recovery of gas from Entrada at 1 Linney, SW 15-17s-25e, in the Bar-X area of Grand County. Production in the general area has been established in Entrada and Morrison. The Bar-X Unit straddles the Colorado-Utah line, and is along the general route of the Pacific Northwest gas pipeline to be built from the San Juan basin to the Pacific northwest states.

COLORADO

Discovery Indicated In LaPlata County

Great Western Drilling Co. recovered gas on test of Fruitland at 1 Spatter NE SW SW 31-33n-9w, LaPlata County, Colorado. The well tested zones from 2,150-2,223 ft. with gas recoveries ranging up to more than half a million cu. ft. per day. The relatively shallow depth and the fact that results are similar to tests in the New Mexico portion of the San Juan basin simulated interest in the well. Location is about 5 miles southwest of Ignacio field. The operator is reported drilling below 3,650 ft.

NEBRASKA

Dawes County Series Staked

Amerada Petroleum Corp. has resumed western Nebraska activity with location for three wildcats in the general Hay Springs area of Dawes County. The company will drill 1 Phies, SW SW SE 22-31n-47w; 1 Anderson, NE SE NE 26-31n-47w, and 1 Wood NW SE SE 28-31n-47w. Amerada was an early operator in this area, with failures drilled north and west of the current series, but has not been active in the area for some time.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

District 1

Atascosa County: Ed R. Bennett 1 Weigang, Lot 4, T. C. Butler Subd., F. Anthony Sur. 137, A-15. Dry. TD 4,115 ft.

Carter & Carter 1 Tullos, Perry Davis Sur. 1092. Temporarily abandoned. TD 4,291 ft.

Wherry & Green 1 Lujan-Steinle, John Noble Sur. 1438, A-649. Dry. TD 5,326 ft.

Edwards County: Phillips Petroleum Co. 1-A Carson, Solomon C. Page Sur. 239. Dry. TD 9,970 ft.

McMullen County: Argo Oil Corp. 1 Bass, C. T. Stansel Sur. 60, A-1140. Dry. TD 3,600 ft.

George H. Coates 1-A Nueces, HT&B Sur. 21, A-257. Dry. TD 1,762 ft.

District 4

Nueces County: L. A. Douglas and Greenbrier Oil Co. 1 Hoelscher, AB&M Sur. 409, A-555 (Violet area). Dry. TD 8,270 ft.

San Patricio County: Appell Oil & Gas Corp. 2 Brown, Block 15, J. J. Summers Subd., Delgado Grant. Dry. TD 5,209 ft.

H. H. Howell L. Stiba, Block 7, Section 23, 3rd Addition to Taft Farm Lots. Dry. TD 4,973 ft.

Webb County: Blanco Oil Co. and Sid Katz Exploration Co. 1 Investors Royalty Co., Share 6, Block 64, Albercas Grant. Dry. TD 2,696 ft.

Zapata County: Miller & Pierce 3 Rodriguez, Share E, Charco Redondo Grant. Dry. TD 1,289 ft.

TEXAS GULF COAST

District 2

Bee County: Alaska Steamship Co. et al 1 McNeill-Montgomery Unit, H. H. Williams Sur., A-403. Dry. TD 4,867 ft.

Calhoun County: Humble Oil & Refining Co. 1 State, Tract 132, Matagorda Bay. Dry. TD 6,049 ft.

Jackson County: Bradco Oil & Gas Co. 1 Meador, Sylvanus Hatch Sur., A-27. Dry. TD 6,830 ft.

N. B. Hunt 1 Fenner, Section 1-B2, I&GN Sur., A-189. IP 10,500 M.c.f. daily, open flow, dry gas. Greta sand 2,854-60 ft. (perforations). TD 4,844 ft. (New field.)

Lavaca County: Progress Petroleum Co. 1 Lass, R. J. Woodward Sur. Dry. TD 8,100 ft.

Live Oak County: Atlantic Refining Co. 1

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THE OIL AND GAS JOURNAL

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WILDCAT COMPLETIONS

McMillan et al, A. Brennan Sur., A-83. Dry. TD 6,010 ft.

Refugio County: Childress Drilling Co. 1 Boenig, Refugio Town Tract (northeast edge Woodsboro field). Dry. TD 6,750 ft.

Victoria County: Magnolia Petroleum Co. 2-A Keeran Ranch, Martin de Leon Sur. IP 4,500 M.c.f. daily, open flow, dry gas, perforations 3,356-61 ft. and 3,363-64 ft. TD 8,600 ft. (New field.)

District 3

Brazoria County: Ralph E. Fair 1 Sattgast et al, Lot 27, Thomas Spraggins Sur., A-366. Dry. TD 6,652 ft.

Caroline Hunt Sands 1 Cannon, S. F. Austin Sur., A-25 (Bonney area). Dry. TD 10,250 ft.

Fort Bend County: Meredith & Co. 1 Gordon, J. D. Vermillion Sur., A-339. Dry. TD 7,840 ft.

Harris County: H. E. Williams 1 Adams, M. Tejerino Sur., A-763. IP 120 BOPD, 7/64-in., 40°, perforations 5,573-74 ft. TD 5,575 ft. (New area 1 mile southwest of Tomball field.)

Charles B. Wrightsman and Pat R. Rutherford 1-A Kennedy et al, David Harris Sur., A-26. Dry. TD 8,756 ft.

Jefferson County: Chance Drilling Co., Inc., 1 Daniel, T&NO Sur. 143, A-366. Dry. TD 9,805 ft.

San Jacinto Petroleum Corp. 2 McFaddin Trust, T&NO Sur., A-451 (McFaddin Beach area). Dry. TD 8,270 ft.

Matagorda County: F. A. Callery, Inc., 1 Langham est., Block 4, I&GN Sur. 7, A-264. Dry. TD 11,025 ft.

Orange County: American Republics Corp. and Houston Oil Co. 2-A Lutcher-Moore, James Dyson Sur., A-8. Dry. TD 9,722 ft.

W. V. Bowles & Co. 5 Moses Granger heirs, William Dyson Sur., A-10. IP 96 BOPD, 10/64-in., 23.9°, perforations 4,190-94 ft. TD 5,272 ft. (New pay and fault segment in Orange field.)

Polk County: Jordan Drilling Co. 1 Luthe, C. Tracey Sur., A-569. Dry. TD 6,002 ft.

San Jacinto County: L. D. French 1 Boone, Solomon Cole Sur., A-84 (Shepherd area). Dry. TD 8,527 ft.

EAST TEXAS

Anderson County: William P. Catleman 1 Ealy et al, E. C. Smith Sur. Dry. TD 451 ft.

Cherokee County: Ralph Spence et al 1 Vernon & Hollie Pugh, W. D. Webb Sur. A-910. Dry. TD 5,210 ft.

Stroube & Stroube 1 Haberle et al, Jose Pineda Sur. A-40. Dry. TD 5,150 ft.

Freestone County: William D. McBee 3 Settlemyre, Wm. Penman Sur. A-831. Dry. TD 1,258 ft.

Rusk County: Lyons, McCord & Logen 1 Uttley, S. J. Hendricks Sur. A-435. IP 9,800 M.c.f. of gas per day, Pettit 6,762-73 ft. TD 6,875 ft. (Gas discovery).

WEST CENTRAL TEXAS

Brown County: Woodson Oil Co. et al 1 Wright, Stephens Jones Sur. 282. Dry. TD 1,445 ft.

Callahan County: Fain & McGaha 1 Snyder, 6-C, T&NO. IPF 1,920 BOPD, calculated, ¾-in., 41°. Barnett shale open hole, GOR 600:1. Top pay 4,357 ft. TD 4,367 ft. (Oil discovery).

Paine Production Co. 1 Harville, Geo. Hancock Sur. 386. IPF 140 BOPD, 16/64-in., 41°. Gray sand 3,943-53 ft., top pay 3,943 ft., GOR 800:1. TD 4,117 ft. (Oil discovery).

Pethybridge & Erlich et al 1 Cutbirth, Alfred Smith Sur. 225. IPP 90 BOPD, 22/64-in. choke, 44°, Cross Plains sand 2,044-48 ft. TD 2,051 ft. GOR 280:1. (Oil discovery).

West Central Drilling Co. 1 Pechacek, 48, BBB&C Sur. Dry. TD 4,250 ft.

Coleman County: Bridwell Oil Co. 1 Walker, M. R. Tatem Sur. 741. Dry. TD 2,278 ft.

E. C. Brown 1 Croom, 36-2, GH&H. IPP 85 BOPD, Morris sand, top pay 2,846 ft., 40°. TD 2,910 ft. (Oil discovery).

Davis Bros. 1 Martin, Miquet Benite Sur. 870. Dry. TD 2,902 ft.

McKissick Products Corp. et al 1 Louder, T. S. Goodrum Sur. 307. Dry. TD 1,934 ft.

Jack Stroube 1 Henderson, Blk. 4, Richard Perry Sur. 95. Dry. TD 1,217 ft.

Eastland County: Clark P. Chandler 1-B Tyler-Breeding, Sec. 1, GC&SF. Dry. TD 3,707 ft.

Haskell County: James H. Snowden et al 1 Norman, 64-1, H&TC. Dry. TD 6,006 ft.

Jones County: West Central 1 Williams et al, 20-19, T&P. Dry. TD 5,141 ft.

Shackelford County: Gilchrist Drilling Co. 1 Reynolds, Sec. 69, LAL Sur. Dry. TD 3,989 ft.

Taylor County: J. E. Connally et al 1 Hamilton, 34-19, T&P. Dry. TD 5,310 ft.

TEXAS PANHANDLE

Hansford County: Clark-Roark-Hooker & Hill 1 Cavin, 5-T-Sec. 3, T&NO. Dry. TD 6,873 ft.

Hutchinson County: Phillips 3 Price, 2-223, I&GN. Dry. TD 3,750 ft. (Geol. wildcat).

Roberts County: Cree et al 1 Gulf-Flowers, C-77, G&M. Dry. TD 3,940 ft.

Phillips 2 Price, 2-191, I&GN. Dry. TD 3,875 ft. (Geol. wildcat).

NORTH TEXAS

Archer County: L. T. Burns Est. 1-B McGregor Est., Coleman Subd., Brazos CSL A-18. Dry. TD 5,689 ft.

Fred R. Dickey 1 McWhorter Fee, Blk. 5, W. E. Probert Sur. Meade Subd. Dry. TD 1,449 ft.

Russell Maguire 1 Bradshaw, BBB&C Sur. A-43. Dry. TD 1,498 ft.

Baylor County: W. A. Lofton and T. V. Gorman et al 1 Marak, Wichita Valley RR, Sec. 19, Blk. 1, D&W RR. Sur. Dry. TD 1,990 ft.

Palmer Drilling Co. 1 Kolacek, Sec. 25, H&TC Sur. Dry. TD 2,000 ft.

Clay County: Hayden Farmer 1 Brown Fee, Blk. 57, Wood CSL Sur. A-875. Dry. TD 4,065 ft.

Grayson County: Kay Kimbell 1 Walter Powell, D. S. Southmayd Sur. A-1077. Dry. TD 6,968 ft.

Larson & Thomas 1 Cordell Unit, J. B. McAnair Sur. A-763. IPF 236 BOPD, 8,475-500 ft., 14/64-in., 37.5°. TD 8,542 ft. (Oil discovery).

J. L. Shaw 1 Short et al, F. M. Walker Sur. A-1360. Frac. 46, Univ. Lands. Dry. TD 7,500 ft.

Jack County: Marin Production Co. 1 Bloodworth, G. W. Robnett Sur. A-1169. Dry. TD 4,903 ft.

Knox County: Rowan & Hope 1 Homer, D. G. Burnett Sur. 14. Dry. TD 5,237 ft.

Montague County: Republic Natural Gas Co. 1 McCall, E. F. Vankirk Sur. A-1570. Dry. TD 5,987 ft.

Wilbarger County: Frank Ausanka, Trust 1 Waggoner BMC, 39-4, H&TC. Dry. TD 2,010 ft.

Dublin Kiel 1-V W. T. Waggoner, 10-13, H&TC. Dry. TD 2,505 ft.

Lloyd Patton, 1-C W. T. Waggoner estate, J. D. Parnell Sur. A-1461. Dry. TD 2,007 ft.

J. K. Wadley et al 1 Jennie Coffee et al, 44-15, H&TC. IPF 287 BOPD, 4,200-44 ft., 40.8°, ½-in. TD 4,283 ft. (Extension to Fargo field).

WEST TEXAS

Andrews County: F. Kirk Johnson 1 Pattillos, 22-A-36, PSL. IPF 102 BOPD, top pay 4,320 ft., 30.5°, GOR 1,450:1, 1-in. TD 4,593 ft. (Oil discovery).

Borden County: Republic Natural Gas Co. 1 McDowell Est., 84-25, H&TC. Dry. TD 7,284 ft.

Cochran County: Ralph Abbey et al 1 Reed-Starnes, 57, Harrison & Brown. IPP 210 BOPD, top pay 5,008 ft., 30.5°, GOR 900:1. TD 5,039 ft. (Oil discovery).

Ralph J. Abbey et al 2 Reed-Starnes, 58, Harrison & Brown. IPP 149 BOPD, top pay 4,999 ft., 30.5°, GOR 250:1. TD 5,032 ft. (Oil discovery).

Crockett County: Bankline Oil Co. and Hunt Oil Co., Ltd., 42-1 Tippett, 42-31, H&TC. IP 95,000 M.c.f. of gas per day plus 41 bbl. dist. per MCFGPD. TD 6,174 ft. (Gas discovery).

Humble 1 Fee "H", 57-UV, GH&SF. IPF 88 BOPD, Ellenburger 6,930-50 ft., ½-in., 37°, GOR 3,704:1. TD 6,970 ft. (Oil discovery "E. Todd Ellenburger").

Ector County: Forest Oil Corp. 1-H Blakeney, 30-43, T-1-N, T&P. IPF 164 BOPD, Holt 4,988 ft., 38°, GOR 422:1, ¼-in. TD 5,085 ft. (New Holt pay in Goldsmith).

Gaines County: Anderson & Crevolin 1 Louis Sprague et al, 7-A-28, PSL. Dry. TD 4,367 ft.

Howard County: Russell Maguire 1 Hodnett "A", 13-25, H&TC. Dry. TD 8,015 ft.

Mitchell County: J. Ray McDermott & Co. 1 Mackey, 10-29, T-1-N, T&P. Dry. TD 8,146 ft.

Pecos County: Albert C. Bruce, Jr. and Thos. J. Devine 1 White et al, 5-194, GC&SF. Dry. TD 1,608 ft.

Macmillan Petroleum Corp. 1 Clayton W. Williams et al, 14, Blk. 2, H&TC. Dry. TD 5,173 ft.

Schleicher County: L. E. Scherck 1 Judkins, 14-A, GH&SA. Dry. TD 4,905 ft.

Liedtke & Liedtke et al 1 Williams, 38-I, GH&SA. Dry. TD 5,890 ft.

Tom Green County: Caroline Hunt Trust Estate 1 Pauline and Elsie Jameyson, 70, Chas. A. Clark Sur. A-128. Dry. TD 5,975 ft.

Paul C. Teas & Associates 1 Wilbur Brown, Jr., John Donavan Sur. 65. Dry. TD 6,050 ft.

Yoakum County: Amerada 2 L. B. Tannehill et al, 904-D, J. H. Gibson Sur. IPF 539 BOPD, ½-in., 42.4°, GOR 230:1, top pay 8,940 ft. TD 11,530 ft. (Oil discovery).

WEST TEXAS BORDER COUNTIES

Coke County: Garrett M. Smith 1 TXL, T&P Sur. 1, A-721. Dry. TD 6,608 ft.

Sun Oil Co. 1 Millican, 240-2, H&TC. Dry. TD 601 ft.

Sun 1 Schooler, 240-2, H&TC. Dry. TD 7,246 ft.

Fisher County: Sojourner Drilling Co. 1 Deere, 36-1, HT&B. Dry. TD 6,271 ft.

Nolan County: Paul Barnhart & Roberts 1 Davis, 164-1-A, H&TC. Dry. TD 7,212 ft.

General Crude Oil Co. 1 Cave, 249-64, H&TC. Dry. TD 6,612 ft.

Texas Pacific Coal & Oil Co. 1 Clayton, 27-20, T&P. Dry. TD 6,554 ft.

Runnels County: Childress Drilling Co. 1

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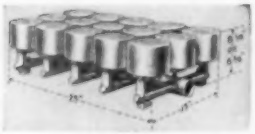

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WILDCAT COMPLETIONS

Russell, 188, A. Kussenburger Sur. A-332. Dry. TD 4,609 ft.

S. C. Herring Drilling Co. 1 Adams, Blk. 437, Geo. Hancock Sur. 473. Dry. TD 4,400 ft.

Stonewall County: Jake L. Hamon and S. C. Herring 1 Ivey, 29-D. Dry. TD 6,211 ft.

SOUTHEASTERN NEW MEXICO

Lea County: Edward E. Kinney 1 Magnolia-State, 32-19s-32e. IPP 200 BOPD, 3,243-51 and 3,275-80 ft. TD 3,306 ft. (Oil well).

Sunray Oil Corp. 1 State "B", 16-12s-32e. IPP 65 BOPD, open hole 3,008-25 ft. TD 3,025 ft. (Oil well).

INDIANA

Spencer County: Grant Mullinax 2 A.&E. Lamar, NW NE NE 11-5s-6w. Dry. TD 1,230 ft.

KENTUCKY

Butler County: Wm. Spellisy 1 Kitchens, SE NE NW 6-H-34. Dry. TD 900 ft.

Henderson County: Hupp Oil Co. 1 Berry, NW SE SE SE 13-O-24. Dry. TD 2,561 ft.

McLean County: Geo. S. Engle 1 Fireline, S½ SE SW NE 1-N-25. Dry. TD 2,554 ft.

Todd County: L. Biddle 1 Browder, NE NW NW SE 22-D-29. Dry. TD 1,410 ft.

MICHIGAN

Berrien County: Clapsaddle Drilling Co. 1 Kean, NW NW NE 2-3s-17w. Dry. TD 1,032 ft., in Traverse lime.

Turner Petroleum Corp. 1 Holle, SW NW NW 12-5s-17w. Dry. TD 785 ft. in Traverse lime.

Cass County: Theodore T. Nowak 1 Huff, NE SW NE 13-5s-15w. Dry. TD 1,184 ft. in Traverse lime.

Isabella County: Socony-Vacuum Oil Co., Inc. 1 Funsch, SW NW SW 32-13n-5w. Dry. TD 3,534 ft. in Dundee.

Lenawee County: Grand Valley Drilling Co. 1 Bush, SW SW NW 16-5s-5e. Dry. TD 972 ft. in lower Detroit River or Sylvania.

Mecosta County: McClure Oil Co. 1 Lineback, SE NW NE 35-13n-10w. Dry. TD 3,332 ft. in Dundee-Reed City zone.

Oceana County: Russell Fletcher 1 State-Greenwood, NW NW NW 9-13n-15w. Dry. TD 2,105 ft. in Traverse lime.

Washtenaw County: Ford Henry 1 Norcross, SW NW SW 35-4s-4e. Dry. TD 1,004 ft. in Detroit River.

FLORIDA

Walton County: Sunnyland Contracting Co. et al 1 Yawkey, C NE NE 5-4n-18w. Dry. TD 4,628 ft. Elev. 302 ft., lower Tuscaloosa 4,294 ft., Massive 4,452 ft.

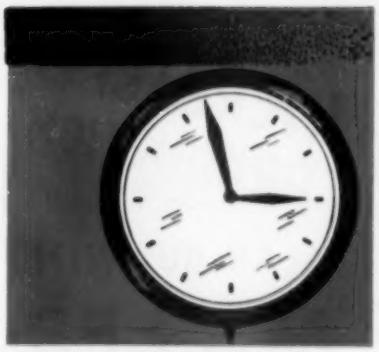
GEORGIA

Macon County: Merica Oil Co. 1 Forhand, Land Lot 182, Land District 1. Dry. TD 2,139 ft.

Merica Oil Co. 2 Forhand, Land Lot 182, Land District 1. Dry. TD 420 ft.

Adams County: H. L. Rowley 1 Scott et al, 30-6n-3w. Dry. TD 6,815 ft. Elev. 288 ft., Wilcox 4,560 ft., base Baker shale 6,383 ft.

Jefferson County: Durbin Bond & Co., Inc., and Petersen Drilling Co. 1 Truly, 71-9n-1w. Dry. TD 6,208 ft. Elev. 215 ft., Wilcox 3,806 ft., base Baker shale 5,632 ft.



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WILDCAT COMPLETIONS

ALABAMA

Escambia County: Sunnyland Contracting Co. 2 Alger-Sullivan, C NE NE 10-2n-5e. Dry. TD 6,732 ft. Elev. 295 ft., Lower Cretaceous 6,499 ft.

SOUTH LOUISIANA

Cameron Parish: Continental Oil Co. 1-A State Lease 1656, West Cameron Blk. 192, Gulf of Mexico. IP 4,152 M.c.f. daily, ¼-in. 10 BC per M.M.c.f., Miocene 8,810-22 ft. (perforations). TD 10,040 ft. (New field.)

The Texas Co. 2 State Lease 2402, Township 13s-9w, Calcasieu Lake dome, in Calcasieu Lake. Dry. TD 13,304 ft.

Pan American Production Co. 16 Miami Corp., 5-15s-3w. IP E5 BCPD and 4,400 M.c.f. daily, ¼-in., 45.4°, Miocene 8,250-70 ft. (perforations). TD 8,365 ft. (New pay in South Pecan Lake field.)

Jefferson Parish: The Texas Co. 12 State-Barataria Bay, Township 20s-25e, in Barataria Bay. IP 123 BCPD and 9,130 M.c.f. daily, 12/64-in., 44°, Miocene 15,454-81 ft. (perforations). TD 16,045 ft. (New pay in Queen Bess Island field.)

Lafourche Parish: California Co. 4-I State Lease 1367, Blk. 3, Bay Marchand. IP 237 BOPD, 16/64-in., 25°, Miocene 4,060-90 ft. (perforations). TD 4,127 ft. (New pay in Bay Marchand Block 2 field.)

Plaquemines Parish: California Co. 1 State Lease 2449, Main Pass Block 33. IP 40 BOPD, ⅛-in., 26°, Miocene 7,451-55 ft. (perforations). TD 9,502 ft. (New field.)

F. A. Callery, Inc., 1 Louisiana Citrus, 10-17s-25e. Dry. TD 5,528 ft.

St. Bernard Parish: Phillips Petroleum Co. 1 State Lease 2306, Block 41, Chandeleur Sound. IP 947 M.c.f. daily, ⅛-in., dry gas, Miocene 6,248-58 ft. (Perforations). TD 9,500 ft. (New field.)

St. Landry Parish: Falcon Seaboard Drilling Co. 1 Evangeline, 13-6s-1w. Dry. TD 10,060 ft.

Pan Am Southern Corp. 1 Perkins, 53-4s-4e. Dry. TD 8,821 ft.

Terrebonne Parish: The Texas Co. 1 Bay St. Elaine Unit 29, Township 22s-17e (Bay St. Elaine area). Dry. TD 15,000 ft.

NORTH LOUISIANA

Concordia Parish: E. C. Wentworth and Como Drilling Co. 2 Murray, 11-7n-10e. IPF 106 BOPD, Wilcox 5,564-72 ft., 12/64-in. TD 6,223 ft. (Discovery of Waverly Point field).

E. C. Wentworth and Como C-1 Angelina Lumber Co., C SE SE 32-4n-7e. Dry. TD 7,514 ft.

Wentworth-Acadian Petroleum Co.-Como Drilling Co. 1 Turner, 21-8n-10e. Dry. TD 5,978 ft.

Red River Parish: Marvin R. LeGrand and R. K. Harrison 1 Harter, 2-14n-12w. Dry. TD 1-735 ft.

Webster Parish: Hunt Oil Co. et al 1 Ardis C. Burns et al Unit, 9-23n-9w. IPF 248 BOPD, Smackover 11,065-102 and 11,-112-32 ft., 12/64-in., 47°, GOR 2,560:1. TD 11,681 ft. (Oil discovery).

ARKANSAS

Columbia County: McAlester Fuel Co. A-1 Wilson et al, C SW SE 19-16s-19w. Dry. TD 3,900 ft.

Lafayette County: J. F. Magale et al 1 Griffin, C SE SW NE 16-15s-24w. Dry. TD 7,001 ft.

Union County: R. M. Crabtree Production Co. 1 Goodwin, C SW SW 29-18s-13w. Dry. TD 5,500 ft.

Ashland Oil & Refining Co. 1 Purifoy, C SW NE 30-18s-17w. Dry. TD 8,190 ft.

OKLAHOMA

Beckham County: Big Chief Drilling Co. 1 Weaver, SW SW NE 8-8n-22w. Dry. TD 2,207 ft.

Cimarron County: Cities Service Oil Co. 1 Moore "B", NE NE SW 22-3n-3e CM. Dry. TD 6,270 ft. Ellenburger 6,154 ft.

Delaware County: Commercial Oil Co. 1 Gardner, NW NW NW 17-23n-25e. Dry. TD 1,023 ft.

Garfield County: C. Caskey 1 Worrell, NE SE SW 28-24n-3w. Dry. TD 2,624 ft.

Garvin County: Cree-Hoard & Spradlin 1 Boxley, SE SE NE 8-2n-3e. Dry. TD 2,215 ft.

Corrall Oil, Inc. 1 Hargrove, NE SW NW 12-3n-3e. Dry. TD 1,958 ft.

Grant County: Gulf Oil Corp. 1 Newkirk, NE NE NW 10-26n-3w. Dry. TD 4,685 ft.

Kay County: O. H. Parker 1 Lewis, SE SE NE 1-26n-3e. Dry. TD 3,502 ft.

Carlock 1 Boxley, NE NE NE 36-27n-4e. IP 25,000 M.c.f. of gas per day, Skinner sand 2,992½-3,000 ft., open flow. TD 3,242 ft. (Gas discovery).

Kiowa County: W. F. Collins 1 Barnes, SE SW NW 21-6n-17w. TD 549 ft.

McCarty & Butler 1 Dickey, SW SW SE 16-6n-20w. Dry. TD 576 ft.

Lincoln County: R. Cobb, Jr. 1 Davenport, NW NW SW 20-15n-2e. IPF 15-20 BDPD, lower Skinner sand 4,625-35 ft., 2,750 M.c.f. of gas per day. TD 5,401 ft. (Gas-condensate discovery).

Jernigan & Morgan 1 Mason, SW SW NW 18-15n-3e. TD 4,513 ft.

Ellison and Eason Oil Co. 1 Clark, NE NE NE 35-16n-2e. Dry. TD 4,620 ft.

Mayes County: Whitehill 1 Mudd Ranch, SE SW NE 18-19n-18e. Dry. TD 1,035 ft.

Osage County: Clyde King, Jr. et al 1 Osage, NE NE SE 2-28n-5e. Dry. TD 2,996 ft.

Pontotoc County: J. Marvin Boyd 1 Grace, W½ NW SW 10-3n-5e. Dry. TD 1,600 ft.

Rogers County: Slaven et al 1 Ross, NE NE NE 1-22n-15e. Dry. TD 1,290 ft.

Stephens County: Shelbester, Toland & Reeves 1 Tullous, 35-2n-9w. IPP 68 BOPD, 3,-532-56 ft., 37°. TD 3,626 ft. (Oil discovery).

Tulsa County: Buffalo Oil Co. 1 Wright, SE SE NE 26-22n-13e. Dry. TD 1,374 ft.

KANSAS

Butler County: H. H. Blair 1 Owen, NE NE NW 20-29s-6e. Dry. TD 2,815 ft.

Comanche County: Eason 1 O'Connell, C NW SW 10-35s-17w. Dry. TD 6,815 ft. Arbuckle 6,720 ft.

Cowley County: Smitherman 1 Sharrard, SE SE SE 4-33s-4e. Dry. TD 3,130 ft.

Ellis County: Transit Corp. 1 Homburg, SE SE SW 34-11s-20w. Dry. TD 3,965 ft.

Hamilton County: Carter Oil Co. 1 Overton, NE NE SW 24-24s-41w. Dry. TD 5,300 ft. Miss. 5,142 ft.

Harper County: K&E-Derby 1 Crisfield Townsite, SW SE SE 17-33s-9w. Dry. TD 4,830 ft.

Kiowa County: Northern Natural 1 Mullinville, C SE SE 20-28s-19w. Dry. TD 5,575 ft. Arbuckle 5,493 ft.

McPherson County: United Drilling Co. 1 Thiessen, NW SW SW 25-20s-5w. Dry. TD 3,475 ft.

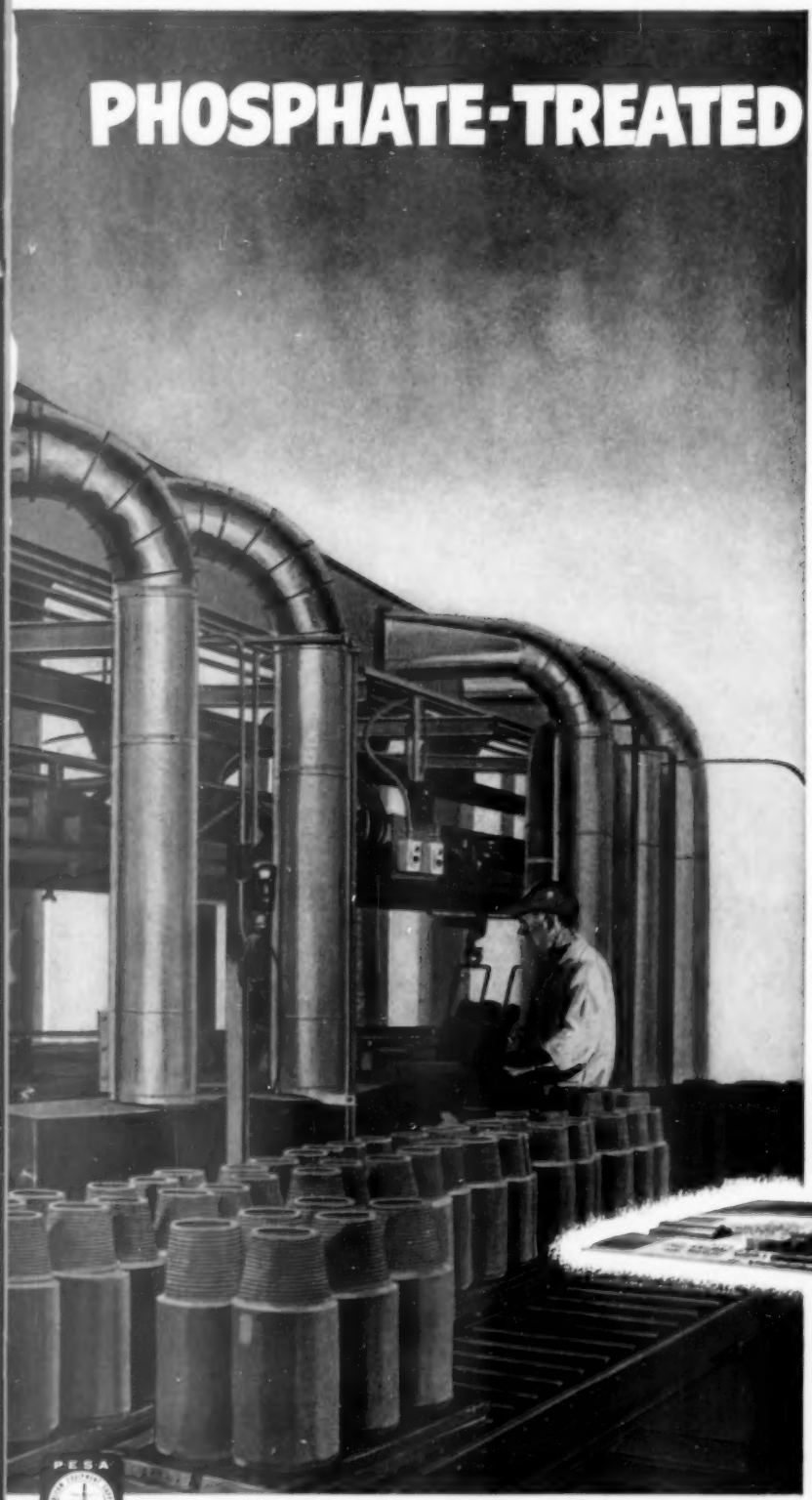
Marion County: Carter Oil Co. 1 Schroeder, NW SE SE 19-19s-2e. Dry. TD 3,300 ft.

Norton County: Gore 1 Brunson, NW NW SW 32-3s-24w. Dry. TD 3,912 ft.

Rooks County: Petroleum, Inc. 1 Schrandt, NE NW SE 25-9s-18w. Dry. TD 3,670 ft.

Another of 15 reasons why **REED** tool joints last longer!

PHOSPHATE-TREATED THREADS ...



THE wearing threads of all **REED** Tool Joints are given a treatment during manufacture to prevent galling.

This treatment converts the surface of the threads into a complex metal phosphate.

During the critical breaking-in period, this surface acts somewhat like a lubricant that *won't squeeze out!*

It effectively prevents galling and premature failure of tool joints.

Phosphate-treated threads is just one of many reasons why **REED** Tool Joints last longer. See the back of this insert for some more reasons.

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REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

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15 reasons why **REED** tool joints last longer!

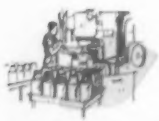
Advanced design. The list of **REED** tool joint developments is assurance that **REED** Tool Joints contain all the latest improvements in design.

Chemical analysis of every heat of steel is checked by spectrograph.

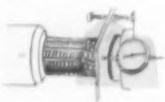
Strength and toughness of every heat of steel are determined by three different testing machines.

Grain structure and grain flow are checked by microscope. **REED** Tool Joints meet the very highest standards.

Hardenability tests are made and form the basis for the "tailored" heat treatment of tool joints made from different heats of steel.



Precision machining is accomplished by specially designed automatic machines.



Jigs and fixtures of the highest precision assure perfect alignment and concentricity of **REED** Tool Joints.

Thread comparator checks hob used to cut **REED** Tool Joint threads, assuring accuracy of thread form, lead and taper.

Automatic heat treating furnaces—especially designed for the job—heat tool joints to utmost precision in a carefully controlled atmosphere.

This central control room enables the heat treat foreman to "tailor" the treatment of each heat of steel to extreme accuracy.

Precision quenching and drawing complete the "tailored" heat treatment that gives the best combination of strength and toughness to every tool joint.

Hardness testing is final assurance that every **REED** Tool Joint is strong and tough.

Tool joint threads are treated to prevent galling during breaking-in. Complex metal phosphate coating acts as a pre-lubricant infused into the threads.

"Reedite" hard facing—available on order—is factory applied to resist abrasion better and make tool joints last longer.

These hand gauges, plus comparators, master gauges, profilimeters, magnaflux and other machines, are used to make the 120 inspections each tool joint must pass.

REED ROLLER BIT COMPANY

HOUSTON 1, TEXAS

'Kirk' Climbs Fast

Chemical engineers head has varied career at 47

FOR a man of 47, Chalmer G. Kirkbride has attained success in a surprising number of apparently unrelated fields.

Already renowned as an engineer, educator, and author, Kirkbride seems destined to reach his greatest achievements in the scientific wonderland of the petroleum industry.

At an age when most young executives would be happy as junior partners in a budding firm, Kirkbride is president and a director of a well-established company—the Houdry Process Corp., developer of the Houdriforming system in refining. He also is a director of Catalytic Construction Co. and president of the American Institute of Chemical Engineers.

"Kirk," as he is known around his home in Wallingford, Pa., started his career in the petroleum industry in the research department of Standard Oil Co. of Indiana. He later transferred to Pan American Refining Corp. at Texas City, Tex., and in 1942 he joined Magnolia Petroleum Co. at Dallas as chief of chemical engineering development.

Temporarily leaving the oil industry in 1944, Kirkbride went to Texas A. & M. College, where he served as distinguished professor of chemical engineering until 1947.

Worked in bakery . . . A native of Oklahoma, Kirkbride received his own scholastic training at the University of Michigan, where he obtained both a bachelor's and master's degree in chemical engineering. During his college days he worked in an Ann Arbor bakery—a fact which may have something to do with his present distaste for pie.

Despite his concentration on technical data, Kirkbride never forgot the importance of the human element in industrial affairs. In 1940-42, while serving as a director of A.I.Ch.E., he organized and served as first chairman of the institute's public relations, program, and membership committees.

He has relied on his public relations talent to instill a keen esprit de corps in Houdry employes. Everybody working under him, from office boy to vice president, is encouraged to drop by his home for an occasional social call—and business chat—after working hours.

Compiled text . . . Kirkbride compiled the subject matter of a course he taught in engineering into a text, "Chemical Engineering Fundamentals," published in 1947 and since adopted by many leading engineering schools.

His literary contributions to the petroleum industry include several technical papers on heat transfer, multicomponent fractionation, and other phases of the industry.

He holds patents on desalting crude petroleum, high-pressure absorption of hydrocarbons, and catalytic processes.

As a fast-climbing business executive, Kirkbride has spoken out repeatedly against the threat to free enterprise of government control and high taxation. He has urged an "effective solution to the problem of high tax barriers, bureaucratic regulation, and executive directives" and has proposed scrapping of the corporate income tax along with elimination of the progressive features of personal income tax laws.

Although he has little spare time on his hands, the Houdry president manages to squeeze a variety of hobbies into an abnormally busy schedule. He drives himself almost as hard at gardening, golfing, trap shooting with his son, Chalmer, Jr., and duck hunting as he does in a busy day at the office.

Roger D. Sears has joined Lion Oil Co. as a junior geologist in the Bismarck, N. D., office.

John Redmond, Shell Oil Co.'s division manager at Oklahoma City, has returned to his position following an assignment at The Hague, the Netherlands.

Ray L. Hamilton has been elected a vice president of Bechtel Corp. Hamilton, who has been with Bechtel for 14 years, has served as a vice president of Bechtel International Corp. and of Canadian Bechtel, Ltd. During his early years with Bechtel, Hamilton served as production manager of Marinship Corp., where he directed the Bechtel-sponsored shipyard's war production record of 78 T-2 tankers and 15 Liberty ships.

M. Halpern, vice president in charge of refining for The Texas Co., has been elected senior vice president, a new executive post. Halpern joined Texaco

M. HALPERN

J. S. WORDEN

in 1916 and in 1940 was elected a vice president. **J. S. Worden,** former general manager of refining, has been elected vice president in charge of refining to succeed Halpern. Worden joined the company in 1921 at its West Tulsa, Okla., refinery and was named general

F. H. HOLMES

T. E. BUCHANAN

manager of refining in 1950. **F. H. Holmes,** former assistant general manager of refining, has been elected vice president in charge of the research and technical department, a new executive post. Holmes has worked for Texaco since 1927 serving in supervisory capacities in refineries both in the United States and abroad. **T. E. Buchanan,** general manager of the marine department, was named vice president. Buchanan has been general manager of the marine department since 1939.

L. E. Pearson, president of Nuco Petroleums, Ltd., has been named president of Lloydminster Petroleum Association. Pearson succeeds **O. C. Yates,**

PERSONALS

the president for the past 9 years. Other officers elected are: Yates, and **J. C. Malone,** vice presidents; **M. J. Blain, R. M. Coons, L. R. Cox, N. Cyprus, H. Fair, J. McKenzie, R. W. Pearson, E. A. Ramsay, R. D. Stroud,** and **J. Wotherspoon,** directors.

Robert M. Milliken has been appointed superintendent of the traffic division for Royalite Oil Co., Ltd. Milliken formerly was with Canadian National Railway.

A. E. Traynor, vice president in charge of sales of Champlin Refining Co., Enid, Okla., has resigned after 23 years with the company.

Robert M. Reedy, former process engineer in the Tulsa refinery of Mid-Continent Petroleum Corp., has joined Creole Petroleum Corp. as a refinery chemical engineer. Reedy will be stationed at Caripito, Venezuela.

Arnold S. Bunte has joined the staff of Denver National Bank, Denver, as consulting geological engineer. A graduate of Colorado School of Mines, Bunte has served as an exploration geologist with Shell Oil Co., a consulting geologist, and chief geologist with Vickers Petroleum Co. In 1953 Bunte joined the faculty of Colorado School of Mines as associate professor of geology, a post he will continue to hold.

W. H. LACY

G. C. HARDIN, JR.

George C. Hardin, Jr., has been named exploration and production manager for Michel T. Halbouty in Houston. Hardin has been associated with Halbouty for 8 years. **W. H. Lacy,** who has been associated with the firm for 3 years, was named general drilling and production superintendent. Other changes in the firm include: **James L. Ward,** formerly with J. S. Abercrombie Co., named district production superintendent at Boling, Tex.; **John E. Walters** appointed division geologist of the newly formed Gulf Coast Frio division; **Fred W. Howells** named division geologist of the new Gulf Coast Yegua-Wilcox division.

J. A. Lentz has been promoted to administrative assistant to the general manager of Continental Oil Co.'s Rocky Mountain region.

Charles C. (Rusty) Williams, former partner in Seismic Engineering Co. of Dallas, has sold his partnership and opened Williams Seismograph, Inc., in Wichita.

William R. Campbell, former district geologist for Stanolind Oil & Gas Co. at Casper, Wyo., has resigned to join the firm of Vaughan, Zoch, Turnbull & Campbell, oil producers, in Denver.

Ross McCollum has been elected president of Mascot Oil Co. McCollum is also president of National Oil Co. and vice president of Basin Oil Co.

Z. C. Ambrose, who has been with Commonwealth Oil Co. and affiliates for 7 years, has resigned. Ambrose was vice president of Southwest Gas Producing Co. and Monla Gas Co., at Shreveport.

T. H. Sterling has been named district vice president of the Oklahoma City district by Oklahoma Natural Gas Co. Other newly elected district vice presidents are: **A. F. Holmes,** Enid district; **E. C. McAninch,** Ardmore district; **C. H. Rich,** Shawnee district, and **P. V. Root,** Muskogee district.

Jack C. West has been named district geologist by Hancock Oil Co. at its new Bakersfield, Calif., offices. **Bob Pascal** has been named to a similar position at new offices in Ventura, Calif.

Richard R. Young has been promoted by Ohio Oil Co. to assistant petroleum engineer at Bay City, Tex. Young had been serving as junior petroleum engineer at Hobbs, N. M.

P. E. Allan, vice president in charge of marketing for Tide Water Associated Oil Co.'s western division, has been named to the newly created post of administrative vice president. He will continue to have his headquarters in San Francisco.

Peter H. N. White has been appointed assistant manager of Imperial Oil, Ltd.'s Regina, Sask., exploration district. White has served with Imperial since 1949 and previously had been with Standard Oil Co. of the Bahamas and Anglo American Oil Co.

J. F. Allen has joined Dow Chemical Co.'s Texas division at Freeport as a design engineer.

Jack D. Newbray has been transferred by Sun Oil Co. from production foreman in the Jameson district, West Texas, to the Rocky Mountain division as production foreman at Rolla, N. D.

Fred B. Branson, assistant comptroller of Gulf Oil Corp., has been named manager of the tax department

F. B. BRANSON

W. T. GRUMMER

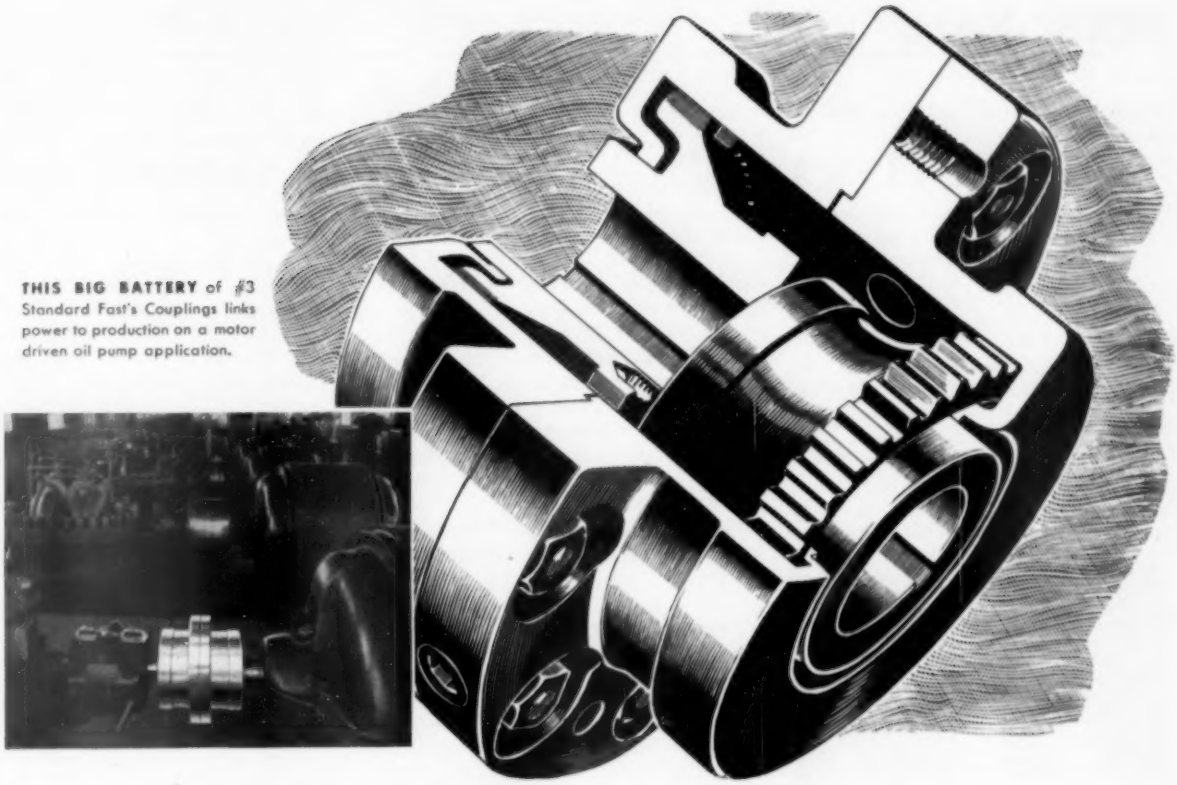
succeeding **Samuel Johnson** who is retiring after 33 years with the company. **William T. Grummer,** manager, accounting, has been elected assistant comptroller of the corporation and its subsidiaries succeeding Branson. **Robert H. Leitch, Jr.,** assistant manager, accounting, has been named manager to succeed Grummer.

Walter L. Youngquist has been appointed professor of geology at University of Kansas. Youngquist leaves International Petroleum Co., Talara, Peru, where he has been senior research geologist and chief of special studies.

James E. Fox, Jr., has been promoted to drilling research engineer with Stanolind Oil & Gas Co. at Fort Worth. Fox was senior petroleum engineer at Tulsa before his advancement.

Ralph B. Ross has been appointed chief geophysicist with Canadian Gulf Oil Co., at Calgary, Alta. Ross had been serving as assistant director of the geology division of Gulf Research & Development Co. at Pittsburgh.

Clark H. Duncan has been named superintendent of Natural Gas Pipeline Co. of America's new gas measurement division. Duncan, who joined the company in 1937, was serving as superintendent of Compressor Station 112, Stinnett, Tex. Other appointments in the new division are: **M. C. Lanagan,** supervisor of Joliet, Ill., and Chicago areas; **C. M. Almon,** general field supervisor; **W. R. McDaniel,** coordinator for



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PERSONALS

the Gulf Coast area, and **C. L. Mouck,** in charge of metering interests in the Panhandle area of Texas.

Alan B. Groh has been promoted to group leader in the pilot-plant division of Standard Oil Co.'s Whiting, Ind., research laboratory.

David E. Day, vice president of Richfield Oil Corp., has been elected a director of Trans Mountain Oil Pipe Line Co. Day replaces **S. D. Bechtel** who has resigned.

Howard C. Vanhooser has been named coordinator of oil movements by Platte Pipe Line Co. Vanhooser's new

H. C. VANHOOSER

L. C. FAUCETT

position will call for coordinating Platte's relationships with its customer-shippers and its connecting carriers. **Lauren L. Faucett** has been advanced from the position of general accountant to chief accountant for Platte.

C. L. Blacksher, who has been Panhandle district superintendent for Skelly Oil Co., at Pampa, Tex., has been promoted to area superintendent of field operations for the southern portion of Skelly's operating territory with headquarters in Tulsa. **W. P. Whitmore,** formerly chief petroleum engineer at Tulsa, has been made area superintendent for the northern portion of the firm's operating territory with headquarters in Tulsa. **D. E. Smith** has been promoted from petroleum engineer to chief engineer. **V. E. Fletcher,** former district foreman at Kermit, Tex., replaces Blacksher as Panhandle district superintendent and **C. W. Steele,** formerly in the Monahans, Tex., office replaces Fletcher at Kermit.

William M. Johnson, assistant to the vice president of the New Orleans area of Shell Oil Co., has been made an executive assistant.

Donald E. Everet, petroleum engineer with Union Oil Co. of California, has been transferred from the Orcutt, Calif., office to Los Angeles where he will work on offshore problems.

Philip A. Chenoweth, assistant district exploration geologist for Sinclair Oil & Gas Co. at Ardmore, Okla., has resigned and on September 1 will become associate professor of geology at University of Oklahoma.

Damon Holditch has been named district manager of the South Texas district of Lone Star Gas Co. and its subsidiary, Lone Star Producing Co. Other appointments are **Ronald F. Crawford,** district production engineer of East Central Texas, transferred to district manager at Oklahoma City; **C. J. Harrison** succeeds Crawford as district production engineer.

George T. Piercy, former manager of the refining coordination division of Esso Standard Oil Co., has been named assistant general manager of the supply department. **J. M. Shivers,** manager of the crude and marketing division at Esso's Baton Rouge refinery, will succeed Piercy. **C. C. Garvin,** assistant to Shivers at Baton Rouge, has been named to succeed Shivers.

Thomas L. Wark, vice president of Tide Water Associated Oil Co., has been appointed general manager of the

T. L. WARK

C. R. BROWN

company's western division. Wark, who has been with Tide Water 34 years, has been serving as manager of the western division production department since 1937. **Charles R. Brown,** Tide Water vice president, has been named assistant general manager of the western division. Brown, who has been with Tide Water since 1917, was appointed vice president in 1948.

Charles F. Gates has been promoted to chief production engineer in the production department of General Petroleum Corp. Gates joined General in 1938 and since 1949 has been senior production engineer at Vernon, Calif. He is now chairman of the Pacific Coast district of the American Petroleum Institute's Division of Production.

Edward C. Mishou has been named general manager of Minnesota Pipe Line Co. Mishou formerly served with Interstate Oil Pipe Line Co. as assistant to the division manager, southern division at Shreveport. Before joining Interstate, he was associated with Ajax Pipe Line Co. at Tulsa.

Charles W. Nease has been named district engineer for U. S. Geological Survey for the southeastern district of Oklahoma. Nease, a graduate of University of Oklahoma, will supervise oil lands in 23 southeastern counties on lands of restricted Indians, which include members of Five Civilized Tribes.

DEATHS

John D. Moroney, 81, former division superintendent of the old Sinclair-Prairie Pipe Line Co. at Bartlesville, Okla., died recently. Moroney, who was located in Tulsa for many years, was appointed superintendent at Bartlesville in 1921.

Frederick Louis Rupp, 69, retired chief engineer for Union Gas System, Inc., was killed August 1, when his car overturned near Independence, Kans.

William Gaspar de Koch, 56, died recently in Los Angeles. De Koch had extensive holdings in western United States and Canada.

Bryant Grady (Pat) Patton, 57, former Oklahoma oil producer and a member of the Florida state legislature, died July 30 in Apalachicola, Fla. Patton was best known to the oil industry for his part in the Oklahoma City boom in the thirties.

William (William Wirt) Henry, 57, Tulsa independent geologist, died August 2 in a Tulsa hospital following an internal hemorrhage. Henry was also known as one of the country's leading authorities on bird dogs.

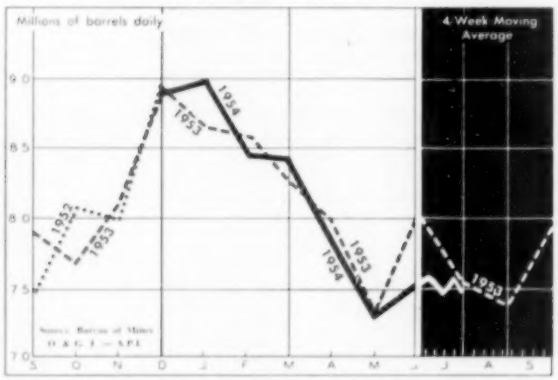
Stephen Wesley Horn, 64, drilling contractor, died recently in Oil City, Pa., after a short illness.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,218,700	DOWN	29,200	DOWN	405,277
Crude stocks	279,885,000	UP	2,137,000	UP	775,000
Completions	1,040	DOWN	102	UP	102
Refinery runs	6,827,000	UP	53,000	DOWN	197,000
Gasoline stocks	158,402,000	DOWN	442,000	UP	16,827,000
Four-product stocks	344,860,000	UP	3,107,000	UP	21,003,000
Total imports	865,800	DOWN	291,500	DOWN	64,100

TOTAL DEMAND – ALL OILS



Better Supply-Demand Balance Has Strengthened Product Markets

REDUCTION in refinery runs in most areas and announced cuts in production allowables in the larger crude-producing states have strengthened product markets.

Distillate-fuel prices moved up 0.25 cent a gallon on the Gulf Coast in the last week of July, following two earlier increases for gasoline, each for 0.25 cent a gallon.

The upturn in the Gulf Coast gasoline market was reflected in increased sales and better prices for natural gasoline. Grade 26-70 natural prices were raised 0.5 cent a gallon on August 2. This increase brings the Group 3 price back to 4.5 cents and North Texas to 4.0 cents.

Natural gasoline on the Group 3 market has been in better demand than the low prices have indicated. There was very little surplus natural in the Mid-Continent, but when the slow movement on the Gulf Coast pulled down the North Texas price, the normal freight differential of 0.5 cent a gallon was maintained by a similar cut in the Group 3 price. The drop in Group 3 actually was forced by the decrease in North Texas since prices with more than the normal 0.5 cent differential would cause an abnormal movement of natural to the Group 3 market.

Residual trends mixed . . . The residual-fuel market is stronger in the Mid-Continent but weaker on the Gulf Coast and East Coast. The addition of coking equipment in the Mid-Continent area has made it possible for refiners to adjust residual supply to meet variations in demand.

On the other hand, the gradual softening of the residual market on the East Coast has made it difficult to market spot material on the Gulf Coast. There have been rumors that some West Coast suppliers have been looking to the East Coast for a market for the West Coast surplus residual. West Coast residual stocks are now 7,400,000 bbl. above last year, and any big movement to the East Coast would tend to depress that market still further.

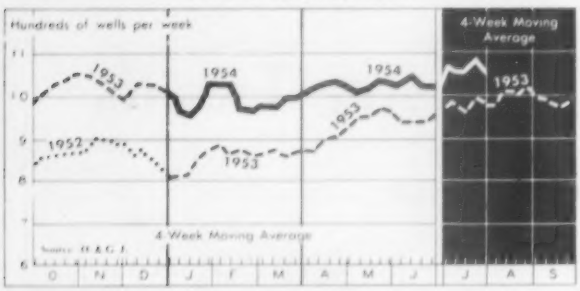
Refinery runs up . . . Refiners increased crude runs 53,000 bbl. daily for week ended July 30, but the average was still almost 200,000 bbl. daily under the corresponding week last year.

Gasoline production for the week totaled 23,326,000 bbl. or 923,000 bbl. less than for the same week last year. Gasoline stocks were reduced only 442,000 bbl. during the week compared with 502,000 bbl. last year.

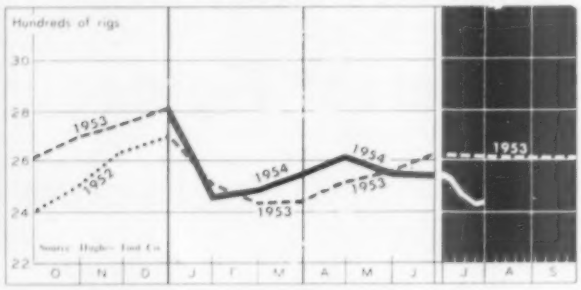
These figures indicate that movement of gasoline out of refineries and terminals during the week was slightly less than last year and that little was accomplished on the big job of cutting back gasoline inventories before the end of September. A desirable gasoline-stock level for the end of September would be about 130,000,000 bbl. In light of the small reduction of about 6,000,000 bbl. in the past 4 weeks, there seems to be little chance that stocks can be cut 28,000,000 bbl. in the next 2 months.

Comparisons with last year during August may give a false picture since gasoline stocks actually increased about 2,000,000 bbl. in August 1953.

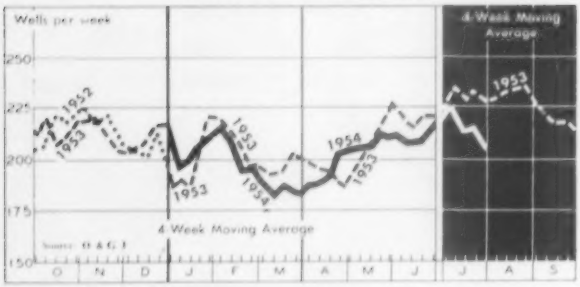
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

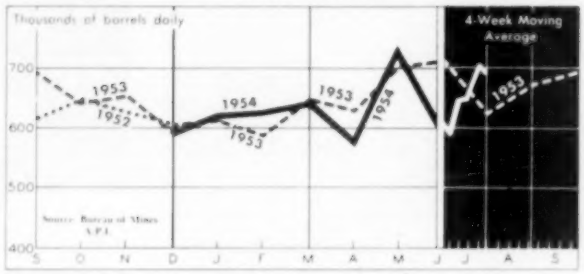
Area—	8-2-54	Change from 7-26-54	Change from 8-3-53
Gulf Coast	546	2	— 31
N. and W. Texas-New Mexico	772	22	— 10
Arkansas-N. Louisiana-E. Texas	155	— 3	10
Oklahoma	310	3	— 46
Kansas-S. Nebraska	157	— 7	— 12
Illinois-Eastern	115	— 7	— 43
Rocky Mountain	263	7	— 4
Pacific Coast	120	— 1	— 50
Total United States	2,438	16	—186
Western Canada	178	11	3

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JULY 31, 1954

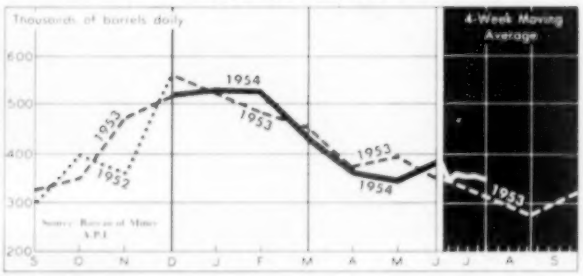
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1954	Cum. 1953	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1954: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	4	0	0	4	13,919	66	82	0	0	0	4	4	2	0	2	56	60
Arkansas	16	6	0	10	63,743	374	286	0	0	0	4	4	17	0	4	65	86
California	38	28	1	9	189,852	1,423	1,502	0	0	0	7	7	40	1	8	303	352
Colorado	26	12	0	14	136,993	770	357	1	0	0	11	12	23	0	10	291	324
Illinois	60	37	0	23	139,722	1,629	1,066	0	0	0	0	0	6	0	0	223	229
Indiana	6	3	0	3	8,542	450	729	0	0	0	1	1	5	0	0	86	91
Kansas	95	39	5	*51	336,577	2,628	2,867	0	0	1	16	17	46	0	11	349	406
Kentucky	16	7	0	9	27,110	654	609	0	0	0	4	4	11	0	3	63	77
Louisiana	81	55	8	18	563,696	2,000	1,504	4	2	2	8	16	64	38	22	189	313
North	36	30	1	5	104,366	1,084	620	2	0	0	3	5	8	3	7	75	93
South	45	25	7	13	459,330	916	884	2	2	2	5	11	56	35	15	114	220
Michigan	15	3	0	12	29,227	322	332	0	0	0	8	8	11	0	0	132	143
Mississippi	7	4	0	3	57,842	233	220	0	0	0	2	2	5	0	0	84	89
Montana	9	3	0	6	39,525	175	230	0	0	0	5	5	3	0	1	50	54
Nebraska	7	5	0	2	40,898	207	198	1	0	0	2	3	13	0	3	65	81
New Mexico	23	11	11	1	97,368	642	793	2	0	0	0	2	12	0	12	68	92
North Dakota	9	7	0	2	59,454	162	151	0	0	0	2	2	4	0	0	56	60
Ohio	18	10	4	4	35,922	671	595	0	0	0	0	0	3	0	4	9	16
Oklahoma	188	114	4	†70	511,495	5,468	4,257	1	1	1	17	20	70	3	18	373	464
Pennsylvania-New York	44	9	20	‡15	94,496	1,396	1,413	0	0	0	0	0	0	0	5	23	28
Texas	355	205	22	128	1,702,709	10,725	10,110	14	0	4	80	98	465	46	93	2,434	3,038
Southwest (1 & 4)	40	20	2	18	175,555	1,516	1,640	0	0	0	11	11	72	22	25	415	534
Gulf Coast (2 & 3)	50	22	7	21	333,268	1,581	1,499	2	0	2	16	20	50	19	29	392	490
East (5 & 6)	22	7	8	7	118,740	566	478	0	0	1	4	5	8	0	8	163	179
North Central (7-B & 9)	126	73	0	53	449,213	4,012	3,838	6	0	0	30	36	201	4	12	992	1,209
West (7-C & 8)	97	69	3	25	552,852	2,495	2,181	6	0	1	15	22	132	0	14	420	566
Panhandle (10)	20	14	2	4	73,081	555	474	0	0	0	4	4	2	1	5	52	60
Utah	0	0	0	0	0	36	43	0	0	0	0	0	3	0	1	20	24
West Virginia	9	1	6	2	22,895	323	352	0	0	0	0	0	0	0	17	9	26
Wyoming	13	7	0	6	72,727	794	385	0	0	0	3	3	27	0	4	112	143
Miscellaneous (S. D.)	1	0	0	1	7,465	84	38	0	0	0	1	1	2	0	0	16	18
Total United States	**1,040**	566	81	393	4,252,117	31,232	28,119	23	3	8	175	**209**	832	88	218	5,076	6,214
Total previous week	1,142	641	101	400	4,476,014			31	1	8	182	222	809	85	210	4,901	6,005
Total August 1, 1953	938	482	94	362	3,719,334			27	2	11	177	217	845	65	222	5,257	6,389

Service wells included: *3, †7, ‡13.

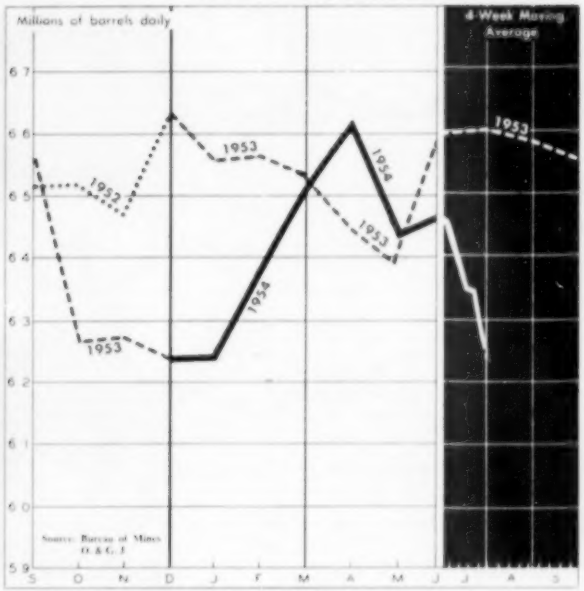
CRUDE IMPORTS



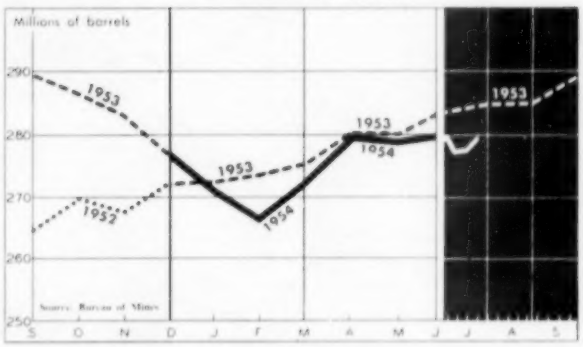
PRODUCT IMPORTS



CRUDE-OIL PRODUCTION



CRUDE-OIL STOCKS



DAILY AVERAGE PRODUCTION FOR WEEK

	July 31			July 24
	Crude oil	Lease condensate	Total	total
Alabama	4,200		4,200	4,300
Arkansas	75,800	500	76,300	76,700
California	978,800		978,800	979,700
Colorado	130,600		130,600	131,400
Eastern	55,100		55,100	55,100
Florida	1,625		1,625	1,625
Illinois	179,900		179,900	174,300
Indiana	28,400		28,400	27,800
Kansas	331,100		331,100	333,700
Kentucky	35,800		35,800	34,300
Louisiana	627,500	33,500	661,000	660,000
North	107,500	3,000	110,500	109,500
South	520,000	30,500	550,500	550,500
Michigan	31,700		31,700	33,700
Mississippi	87,200	3,000	90,200	89,800
Montana	36,900		36,900	38,900
Nebraska	19,500		19,500	19,500
New Mexico	203,300	1,075	204,375	204,575
Oklahoma	470,600		470,600	500,300
Texas	2,573,000	45,500	2,618,500	2,618,500
Dist. 1	41,000	350	41,350	41,350
Dist. 2	130,200	5,550	135,750	135,750
Dist. 3	414,000	23,100	437,100	437,100
Dist. 4	232,300	5,200	237,500	237,500
Dist. 5	42,500	350	42,850	42,850
Dist. 6	108,000	4,700	112,700	112,700
East Texas field	218,000		218,000	218,000
Dist. 7-B	119,000	25	119,025	119,025
Dist. 7-C	173,000	4,300	177,300	177,300
Dist. 8	835,000	1,700	836,700	836,700
Dist. 9	178,000	200	178,200	178,200
Dist. 10	82,000	25	82,025	82,025
Utah	5,000		5,000	5,100
Wyoming	244,600		244,600	243,700
North Dakota	‡14,500		‡14,500	14,900
Total U. S.	6,135,125	83,575	**6,218,700**	6,247,900
Change from previous week, down			**29,200**	
Canada	†301,550		†301,550	†311,850
Total U. S. production January 1-July 31			1,357,969,925 bbl.	
Same period last year (crude plus cond.)			*1,383,526,007 bbl.	

*Includes 19,572,450 bbl. condensate. †Week ended previous Monday. ‡Includes S. D. 100.

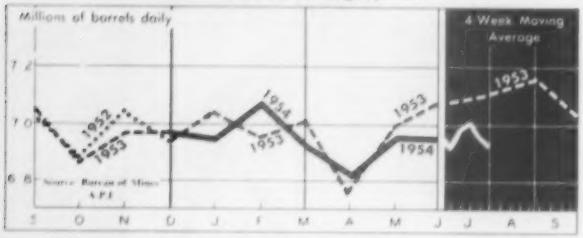
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

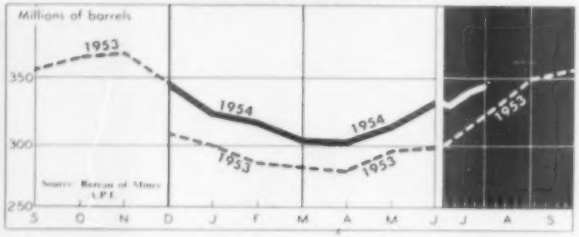
	July 24, '54	July 17, '54	July 25, '53
Pennsylvania Grade	3,219	3,165	1,611
Other Appalachian	1,685	1,762	2,027
Illinois, Indiana, Michigan	12,664	13,015	12,325
Kansas	9,107	9,465	9,202
Oklahoma	27,282	27,348	29,409
Arkansas	3,541	3,665	2,931
Louisiana	17,646	17,177	15,298
North	2,471	2,491	2,313
Gulf	15,175	14,686	12,985
Mississippi	3,205	3,281	3,569
New Mexico	8,559	8,019	7,446
Texas	130,905	129,232	134,839
East Texas proper	11,871	12,100	11,345
West Texas	56,040	54,689	61,807
Texas Gulf	28,443	28,372	27,953
Other Texas	34,551	34,071	33,734
Wyoming	13,678	13,444	14,152
Other Rocky Mountain	4,746	5,295	3,072
California	32,155	31,877	33,297
Foreign	†11,493	11,003	9,932
Total	279,885	277,748	279,110

*Bureau of Mines. †Includes 3,030,000 bbl. in California.

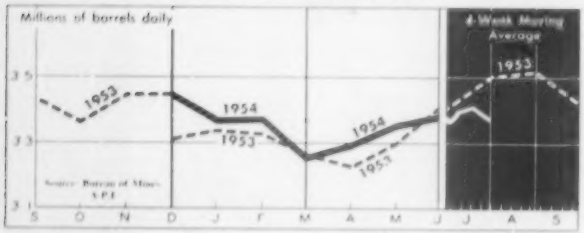
REFINERY RUNS



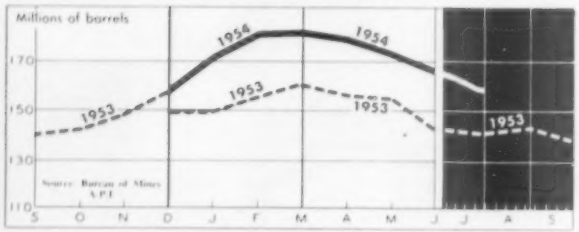
FOUR-PRODUCT STOCKS



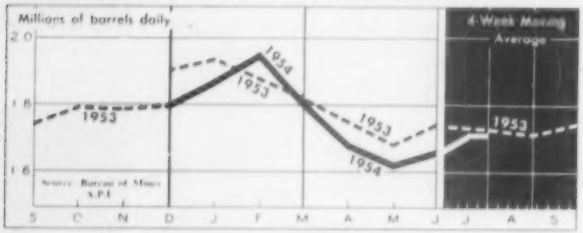
GASOLINE PRODUCTION



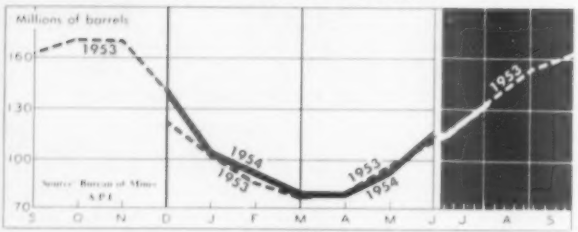
GASOLINE STOCKS



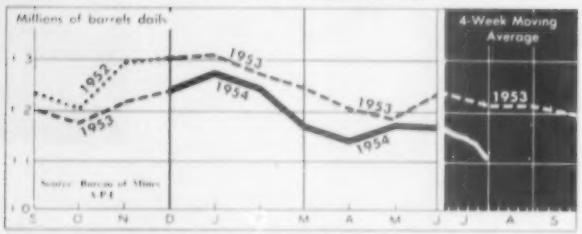
MIDDLE-DISTILLATE PRODUCTION



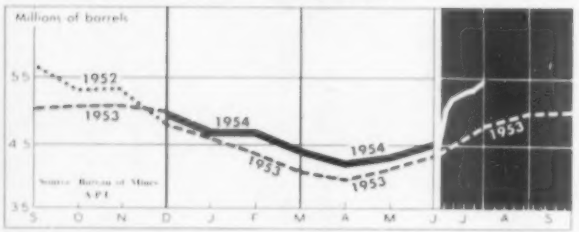
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, JULY 30

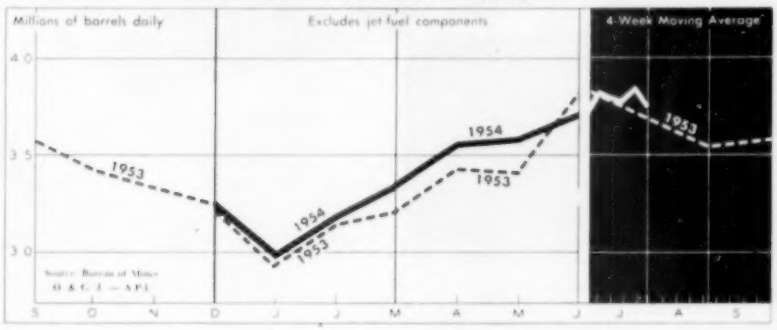
(Excludes all jet-fuel components)

(Thousands of barrels)

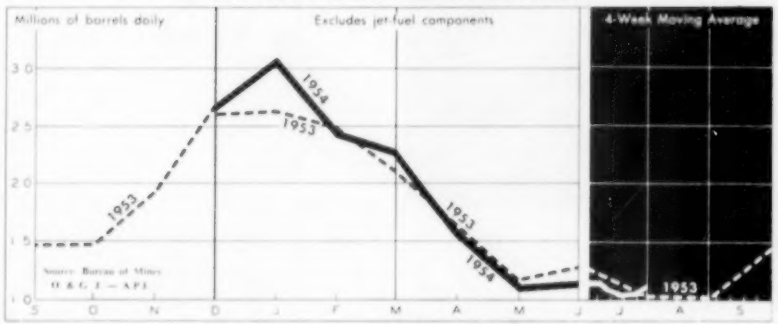
District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, July 1953—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,049	449.6	27.6	297.3	202.0	34,921	12,980	33,537	11,521	1,101	455.9	30.8	264.5	240.8
Appalachian:														
District 1	103	42.7	5.1	15.6	14.0	4,227	569	1,744	469	108	46.4	3.9	19.4	13.3
District 2	85	45.4	2.1	11.9	9.3	2,696	408	775	309	93	51.4	6.0	10.2	13.4
Ind., Ill., Ky.	1,264	672.3	82.3	235.2	145.1	35,916	7,470	20,665	4,943	1,295	717.2	72.1	205.3	162.7
Okla., Kans., Mo.	594	343.7	14.3	126.1	37.4	16,324	1,876	11,186	1,238	632	369.5	16.9	153.4	51.8
Inland Texas	243	169.4	8.6	44.1	27.1	5,695	416	1,959	1,290	263	189.4	10.8	46.2	35.3
Texas Gulf Coast	1,592	801.7	81.8	371.1	212.9	19,600	3,120	10,970	5,791	1,624	837.5	119.0	369.8	229.7
La. Gulf Coast	574	255.3	61.3	140.1	39.9	7,968	2,921	3,900	1,273	572	297.9	47.9	138.9	58.5
N. La. and Ark.	86	35.3	6.9	22.6	4.1	3,860	954	956	112	83	33.7	6.2	20.0	6.7
Rocky Mountain:														
New Mexico	19	12.0	1.0	2.9	2.9	223		60	32	20	12.8	0.4	3.7	3.3
Other Rocky Mt.	239	103.9	1.7	61.3	32.3	7,285	269	2,526	824	242	115.1	1.7	53.4	38.8
California	979	401.0	1.7	142.4	332.9	19,687	385	12,161	26,849	1,070	456.2	5.1	156.6	369.6
July 30, 1954	6,827	3,332.3	294.4	1,470.6	1,059.9	158,402	31,368	100,439	54,651	7,103	3,583.0	320.8	1,441.4	1,223.9
July 23, 1954	6,774	3,366.4	272.9	1,408.0	1,075.0	158,844	31,069	98,255	53,585					
August 1, 1953+	7,024	3,458.4	311.9	1,389.0	1,226.6	141,575	30,310	102,425	49,547					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.

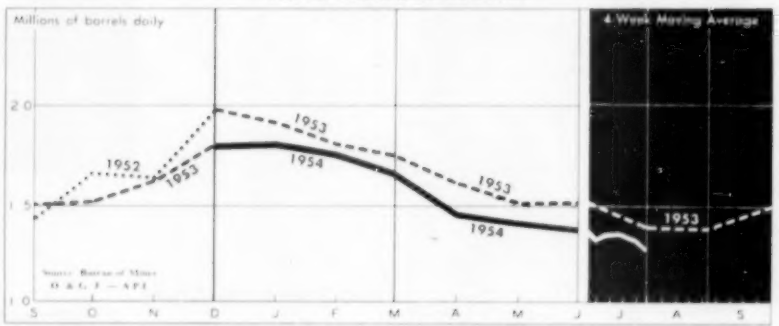
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of August 4, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.5-11	11.25-12	10.25-10.5
Premium gasoline	11.5-12	13-13.75	11.25-11.5
42-44 w.w. kerosine	9-9.25	9.70-9.95	8.75-9
No. 2 straw fuel oil	8-8.25	8.70-8.95	8-8.25
No. 6 residual	$1.10-1.15	$2.05-2.25	$1.75-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	4.5	4.0	4.25
Grade 18-55	5.4	4.9	5.15

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Grade 26-70 natural gasoline moved back up 0.5 cent a gallon on August 2 to 4.5 cents Group 3 and 4.0 cents North Texas. No. 2 distillate increased 0.25 cent on the Gulf Coast in last week of July, and residual gained $0.10 in Group 3.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 7-30-54	3,375	3,720
May 1954	3,377	3,463
June 1953	3,410	3,838
July 1953	3,501	3,690
Middle distillate:		
Four weeks ended 7-30-54	1,715	1,129
May 1954	1,673	1,169
June 1953	1,747	1,280
July 1953	1,735	1,035
Residual fuel:		
Four weeks ended 7-30-54	1,106	1,277
May 1954	1,148	1,356
June 1953	1,238	1,506
July 1953	1,224	1,390

SALES OF L.P.G. BY STATES*

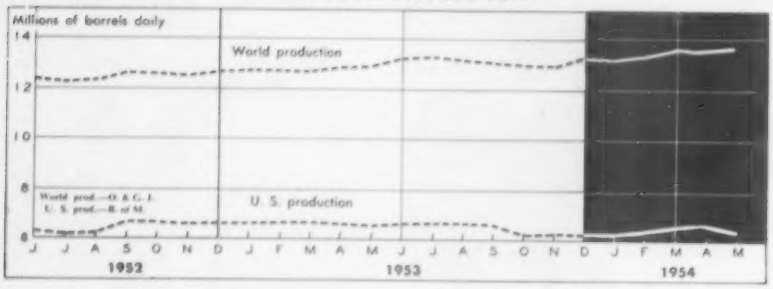
(Thousands of gallons)

	1953	1952
Alabama	57,537	51,873
Arizona	29,461	29,456
Arkansas	112,648	97,136
California	336,479	330,013
Colorado	53,437	49,500
Connecticut	47,277	46,511
Delaware	11,536	11,750
Florida	91,839	78,677
Georgia	84,351	78,389
Idaho	10,576	9,895
Illinois	158,180	148,592
Indiana	130,554	118,384
Iowa	83,655	81,855
Kansas	131,094	114,530
Kentucky	97,493	87,359
Louisiana	306,156	307,237
Maine	18,213	13,417
Maryland and D. C.	30,907	27,224
Massachusetts	41,976	42,099
Michigan	83,204	81,347
Minnesota	92,146	84,523
Mississippi	93,974	86,108
Missouri	106,862	93,809
Montana	16,867	13,605
Nebraska	65,762	55,839
Nevada	17,177	13,780
New Hampshire	13,295	12,716
New Jersey	55,182	57,045
New Mexico	78,025	64,890
New York	73,786	66,022
North Carolina	71,577	68,952
North Dakota	36,920	31,044
Ohio	52,226	45,537
Oklahoma	156,743	137,937
Oregon	43,543	46,600
Pennsylvania	83,306	89,435
Rhode Island	5,951	5,055
South Carolina	45,025	40,385
South Dakota	44,600	40,369
Tennessee	33,504	30,217
Texas	1,471,031	1,240,220
Utah	10,179	8,668
Vermont	11,263	10,462
Virginia	37,216	32,608
Washington	21,681	26,398
West Virginia	154,565	159,540
Wisconsin	93,661	85,687
Wyoming	29,369	24,684
Total United States	4,932,009	4,477,379

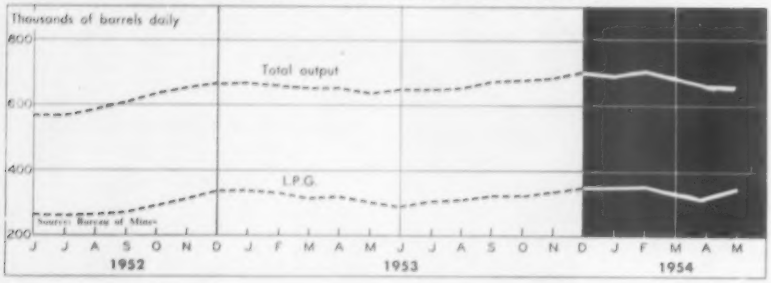
*Bureau of Mines.

(The schedule of selected crude prices appeared on page 409 of July 26 issue and will be printed again next week.)

CRUDE-OIL PRODUCTION



NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



CRUDE PRODUCTION

(Thousands of barrels daily)

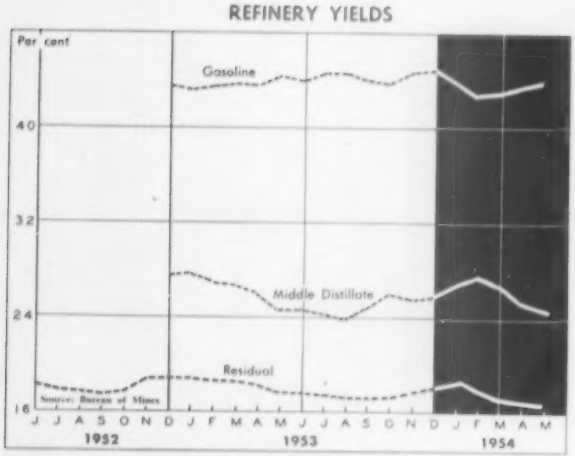
Month—	U. S.	World
May 1954	6,471	13,687
April 1954	6,615	13,609
March 1954	6,507	13,680
September 1953	6,557	13,157
May 1953	6,390	12,995

PRODUCTION AT NATURAL-GASOLINE AND CYCLING PLANTS

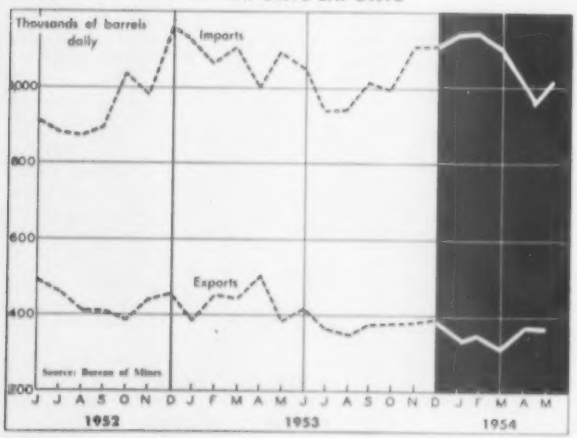
(Thousands of barrels daily)

Month—	L.P.G.	Total
May 1954	304	657
April 1954	313	661
March 1954	332	682
September 1953	317	674
May 1953	300	637

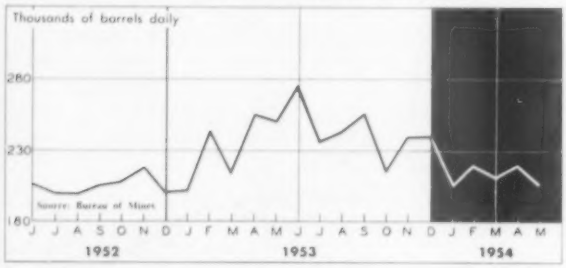
REFINERY YIELDS



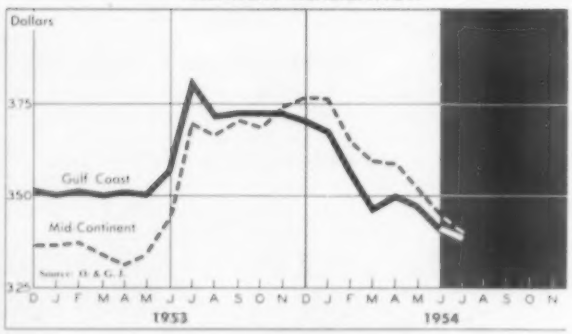
IMPORTS-EXPORTS



TOTAL DEMAND–AVIATION GASOLINE



REFINERY REALIZATION



REFINERY REALIZATION

	July 1954	June 1954	May 1954	July 1953
Mid-Continent	$3.42	$3.42	$3.52	$3.69
Gulf Coast	3.39	3.40	3.47	3.80

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

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FOR SALE EQUIPMENT

FOR SALE—1 used 2½"-3" x 10" Fig. 1450 Wheatley Power Pump, Ser. WBM 2060, mounted on steel base & DC to Buda motor BTH, Ser. No. 226569A. Price $2000.00. Cities Service Pipe Line Co., Bartlesville, Okla.

FOR SALE—At our Oklahoma City Warehouse, attention T. P. Mace, 1—used 4½" x 10" K Frame Worthington Side Pot Type, Hortz. Duplex Power Pump, Ser. #926421, on steel base, & V-belted to RXB, LFH, Hercules Power Unit, #122674, suitable to mud pump for conversion to mud service. Price $2000. Cities Service Pipe Line Company, Bartlesville, Okla.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.
H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE
8" Line Pipe

250,000' 8⅝" OD 28.55# Lapweld

All used #1 grade, machine cleaned, straight, 20' single random lengths, ends beveled. Suitable installation oil, water or gas pipeline systems 850 to 900# PSI. Large additional quantities same size in process, taking up and reconditioning. Priced attractively, prompt shipment, Carrollton, Mo.

Write — Wire — Phone

HUMBOLDT-CHICAGO PIPELINE PROJECT

125 W. 3rd St. Tulsa, Okla.

Phones 2-9128 — 54-4229

FOR SALE EQUIPMENT

WELL DRILLING EQUIPMENT. New and used spudders, rotaries, core drills. Tools, pipe, cable. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colo.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FOR SALE: Rebuilt Streamlined Wilson "Giant," complete with 2 engine rig drive less engines. (1) 7¼ x 14 Gardner-Denver Power Pump. (1) 17½-FE Ideal Rotary Table, 54" Centers. (1) C-10 Unit Rig, complete with 2 Natural Gas Engines. (1) Complete string Rotary Tools, Model 70-B Brewster. 7¼ x 12 G-D Pump. 87' Mast Pole. 4½" Drill Pipe. Photos, Detailed Descriptions sent on request. Contact Mr. Pearson, J-S-G, Inc., 501 N.E. 26th, Okla. City. Jackson 5-6232.

WILSON ATLAS. Sales Price—$21,000.00. Equipped with two L1-600 Cummins Diesel Engines in good condition; includes pump drive, 12 PD groove sheave and V-belts. One American cathead and one plain spool cathead. Compound enclosed oil-bath. Includes one 1000 gal. fuel tank. Contact Cardwell, Houston.

FOR SALE—Bucyrus-Erie 28-L, trailer mounted—In excellent condition—Equipped with Waukesha engine, tool crane, casing tackle strut. Call or write B. W. Moore, Rt. 2, Parkersburg, W. Va., Phone 8-4037.

FOR SALE
INGERSOLL-RAND
GAS ENGINE DRIVEN COMPRESSORS

1—	XVG-8	—350 H.P.
1—	XVG-6	—250 H.P.
1—	XVG-4	—150 H.P.

ANY COMBINATION COMPRESSOR CYLINDERS. SPECIFY INLET AND DISCHARGE PRESSURES. PROMPT DELIVERIES.

EARL E. KNOX COMPANY
TELEPHONE: 2-5204
BACON STREET, ERIE, PA.

FOR SALE EQUIPMENT

WILSON GIANT, San Juan Basin, with 2-V12 Le Roi, 131' L. C. Moore, Sub-structure, Blowout Preventer, 7¼ x 14 Pump, 5000' 4½" D.P., 10 Drill Collars, complete ready to run. P. O. Box 1826, Wichita Falls, Texas.

250 KW Westinghouse Electric Generator Set, powered by 300 hp Sterling Natural gas engine, direct connected, 440 V, 3 ph. 60 cy. AC, excellent condition. Mounted unit steel base, price $6800. W. A. Caplis, Box 1312, Shreveport, La. Ph. 2-5312 nights.

WILSON GIANT—Serial No. 6363. Sales Price—$6,000. Equipped with Two Waukesha 145 GK Engines in good condition. General Appearance—Fair. Rig used for Work-Over. Price includes Kelco Spinning and Foster Breakout Catheads; Stromberg-McCreary Air Starters on Engines. Brakes circulating water-cooled; Manual Friction Clutches in Transmission; Others—Jaw Clutches. Rig has Slush Pump Drive and Rotary Drive. Location of Unit—Lake Charles, Louisiana. Contact Cardwell, Houston.

FOR SALE USED PIPE

7,000 20" O.D. 5/16 Wall 40' length bev. in excellent condition, reasonable.

A. A. GILBERT PIPE & SUPPLY CO.
L.D. 97—P. O. Box 986
Shreveport, La.

GASOLINE PLANT *FOR SALE*

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

FOR SALE
EMSCO GB 800 RIG

This rig fully equipped with many extras. Less than 45,000' of hole drilled with rig and accessories since new. Inventory includes grooved drum, dynamatic brake, heavy duty mast, 12 foot substructure. 2 pumps including Gardner-Denver 800 H.P. GXR, 3 LRDU Waukesha Diesel Engines, Steel Mud Tanks, 4½" Grade E Hand Banded Drill Pipe, 6¼" and 7¾" Drill Collars. This rig is priced right. For details contact

BOX H-307, THE OIL AND GAS JOURNAL,
Tulsa, Oklahoma

FOR SALE EQUIPMENT

FOR SALE: Model "K" Cardwell tubing and rod unit complete with tubing and rod tools, mast, mounted on Ford tandem truck. Melco Drilling Company, Seminole, Oklahoma.

WILSON TITAN, San Juan Basin, 2-LRO Waukesha, 131' Emsco Mast, 10' Sub-structure, 7¾ x 16 Pump, 6000' 4½" D.P., 10 Drill Collars, Blowout Preventer, see on job. P. O. Box 1826, Wichita Falls, Texas.

THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C., now located in southwest, available for inspection. 11 Sperry 18" x 18" cast iron Filter presses, 11 chambers. Consolidated Products Co. Inc. #65 Garden Street, Hoboken, N. J. N. Y. Tel.: BArclay 7-0600.

GOOD USED SWABBING UNIT

Franks Model 7000 skid, single drum, swabbing unit. Serial 1039, spooling capacity with 9/16" line, 12,675 ft. Power: HB-600 Cummings engine; Wisconsin starting engine. Mounted on 1951 B3-JA-170 212" wheelbase Dodge truck, with Thornton Tandem Drive, 8.25 x 20 tires; 6,600 miles on truck. Unit, engine and truck in first-class condition. Located at Odessa, Tex. Write, wire, or phone Franks Mfg. Corp., Box 4218, Whittier Sta., Tulsa, Okla.

FOR SALE

7 Nordberg 3 stage Hi-pressure compressors (4 air, 3 oxygen) Upright type. Air compressors capacity 5000 to 6000 C.F.H. (260 RPM) At 1500 to 1600 lbs. operating pressure. Oxygen capacity 1500 CFH (140 RPM) at 2300 P.S.I. All above new and complete—less motor.

20 Curtis 3 stage Hi-pressure air compressors, 1000 PSI, 1250 C.F.H. at 550 RPM.

4 Completely new oxygen plants. 15,000 Cu. Ft. per day capacity. 99.5% purity. Less power unit.

1 Ingersoll-Rand model C-50 BW type 40, four stage Hi-pressure air compressor. Delivers 3000 P.S.I. at 670 RPM. Complete with 50 H.P. motor and starter. 5000 C.F.H. capacity.

Dye Oxygen Company, Inc. Mfrs.
3332 W. McDowell Rd.
Phoenix, Ariz.

Used Seamless STEEL TUBING

Ideal for gas, water and air lines

2" O.D.
2¼" O.D.
3¼" O.D.
3½" O.D.
4" O.D.
5⅝" O.D.
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Approximately 5 miles of each diameter available in single or double random lengths with beveled ends.

Write — Wire — Phone

SONKEN-GALAMBA CORPORATION
2nd and Riverview (X-982)
Kansas City 18, Kansas
ATwater 9305

FOR SALE EQUIPMENT

MODEL H CARDWELL Servicing Unit. Truck mounted with mast. Fully equipped. Box No. 1 or Phone 153, Canton, Kansas.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

FOR SALE

National 50 rig with 2 NK Waukesha motors. Butane and gas equipped. C 250 pump.

National T 20 rig. GMC diesels. C 150 pump.

Both rigs are complete in every detail. 87' Lee C. Moore masts, 3½" drill pipe. Now running in Illinois. Write or call

D. B. Lesh Drilling Company, Box 380, Mattoon, Illinois. Telephone 5481.

FOR SALE

Unit 10 and unit 15 complete power rigs in excellent condition—new drill pipe—priced reasonable—$175,000.00 in equipment used less than six months—will show or furnish inventories to interested parties.

VERNON WHITELEY DRILLING COMPANY
TELEPHONE 2-2212
TYLER, TEXAS

FOR SALE 12" Line Pipe

125,000 Feet—
12¾ O.D. .375 Wall
49.56 lb. Lapweld

All machine cleaned, commercially straight, 20' single random lengths, ends beveled, used, 1st class condition. Suitable installation—oil, water, or gas pipeline systems. 850# to 900# PSI. Large additional quantities, same size, process, taking up, and reconditioning. Priced attractively, for prompt shipments, Welda, Kansas, and Grandview, Mo.

Write, Wire, Phone

HUMBOLDT-CHICAGO PIPELINE PROJECT
125 W. 3rd St. Tulsa, Okla.
Phones 2-9128 — 54-4229

FOR SALE EQUIPMENT

FOR SALE—1 used 2½"-5" x 10" Gaso Power Pump, Fig. 710-S, Ser. #7435, on steel base & V-belted to HXE Hercules motor, Ser. #330493. Price $2000. Cities Service Pipe Line Company, Bartlesville, Okla.

WILSON SUPER, San Juan Basin, 87' Mast Pole, Substructure, 3000' 4½" D.P., 6 Drill Collars, 7¼ x 12 Pump, complete rig. P. O. Box 1826, Wichita Falls, Texas.

FOR SALE—Wichtex Model X5000 Spudder complete with tools and pipe. Contact Ekco Drilling Corp. Box 1167, Graham, Texas.

PIPE FOR SALE
50,000 feet good used 8" Line Pipe .322 wall. 28.55# Lapweld. 8⅝ OD, .68c per foot. Peter Grimm, 110 Washington Ave., Stamford, Conn.

FRANKS MODEL 5000 Spudder — Serial No. 866. Sales Price—$7,500. Equipped with one Cummins HB1-600 Engine in good condition. Brake Rims in fair condition; Brake blocks—Good. General appearance—Good. Chains—Good. Basic Machine equipped with Spudding attachment, Skid and 65' Double Leg Pipe Mast with 8⅝" and 7" Pipe Legs; 4-Sheave Crown of Wilson Manufacture. Price includes Mast Guy Lines. Location of Unit — Western Kansas. Contact Cardwell, Wichita.

FOR SALE: 1 Mayhew 2000 heavy duty drill with auxiliary motor and 5 x 8 pump mounted on tandem drive Ford truck. In A-1 condition. Lewis & Clemens Drilling Co., Box 101, Princeton, Indiana, Telephone 1460.

EQUIPMENT WANTED

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

MANUFACTURERS AGENT now calling on Oil Production and Oil Refinery Accounts desires new products to introduce into this field. Territory consisting of South Louisiana and Mississippi. Write Box 102, Harvey, Louisiana.

WANTED: Skid mounted mud pump unit 7¼x14 class, preferably Diesel powered. Wire or phone B. A. Hoffman, 4222 Rawlins, Logan-1664, Dallas, Texas.

HELP WANTED

WANTED: Distributor for Gas Lift Equipment in West Texas. Prefer Engineering background but will give consideration to experience. Macco Oil Tool Co. Inc., P. O. Box 7288, Houston 8, Texas.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

ASSISTANT GENERAL Sales Manager for Integrated Independent Refinery. Must have satisfactory experience and general knowledge of markets. Reply should include full particulars in first letter, including resume of experience, education, references and salary expected. Box H-324, The Oil and Gas Journal, Tulsa, Oklahoma.

PERMANENT EMPLOYMENT with large organization for men to serve as Sales Engineers in electric logging. Will be stationed in large cities in operating areas to do quantitative and reservoir work with electric and radioactive logs. Must have degree in petroleum engineering, geophysics, or geology with a minimum of three years' experience, preferably both field work and reservoir study. Will be given thorough training in log interpretation. Box H-309, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Mathematical Analysis Group has openings for TWO mathematicians or physicists with advanced degrees and background in applied mathematics, numerical analysis and digital computing.

One position involves planning and supervision of numerical analysis and digital computing on reservoir engineering and petroleum production problems.

The other position involves mathematical analysis of refinery, pipe line, and exploration problems, including linear programming for optimum operations.

New laboratory building. Excellent benefits and working conditions. Address letter giving education, experience and salary requirement to Personnel Records Division, Continental Oil Company, Ponca City, Oklahoma.

HELP WANTED

SEISMIC Party Chief for work in United States with degree in Geophysics, Geology, or Engineering, age 26 to 35, capable of advancing in small progressive contract seismograph company. Must be good interpreter. Salary commensurate with ability. Please include education and complete brief of experience in first reply. Replies confidential. Box H-331, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPLORATION MANAGER: Aggressive independent oil company has opening for experienced Exploration Manager, fully familiar with Mid-Continent and Rocky Mountain Areas. Must be capable of handling all phases of land and geological operations, originating and closing deals, directing division or district offices. Graduate geologist with major oil company training preferred, between ages of 30 to 40. Excellent opportunity for right party. Do not answer unless fully qualified. In replying give past employment record, educational background, and complete personal data. Box H-330, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEERS WANTED

OIL FIELD Exploration Equipment. Leading instrument manufacturer wants men to sell $2000 electronic instrument to oil companies and geological survey companies. Instrument substantially increases chances of success in wildcat drilling. Salesmen are supplied qualified leads from national advertising campaign. Several choice protected territories open. Will only consider men with heavy experience selling to the oil industry. Must have good earnings record and thorough knowledge of oil geology. Earnings unlimited on commission basis. Write fully stating employment record, past earnings and education. Box H-290, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERS

Experienced graduate engineers or recent graduates, for immediate and future job openings in Saudi Arabia and New York City. For engineering work in development, production, drilling, process, and oil and gas engineering on primary and secondary recovery problems.

CORE EVALUATION ENGINEER

Degree in chemical engineering, physics, or basic engineering, with specific experience in core analysis and evaluation. For work in petroleum laboratory in Saudi Arabia supervising technicians engaged in determining porosities, permeabilities and fluid saturation on core material from Arabian reservoirs. Personal performance of special core work involving very high and very low range permeability determinations by liquids and gases, core resistivity work, capillary pressure determination and possibly relative permeability and water flood studies.

Salary commensurate with education and experience. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 58

ARABIAN AMERICAN OIL COMPANY
505 Park Avenue
New York 22, New York

HELP WANTED

PETROLEUM ENGINEERS: Major oil company in South America has varied positions for single graduate engineers. Must have minimum one year each production and engineering experience. Reply giving full details—age, experience, college, military status, etc. Box H-228, The Oil and Gas Journal, Tulsa, Oklahoma.

SOUTH AMERICA. Major Oil Company. Our fee paid. Mechanical Engineer—Petroleum Engineer—Chemical Engineer—All requiring Degree, experienced or inexperienced. Geologist, single. Must have degree, some experience. Tool Pusher—under 40, three years' experience. Accountant—Degree, Accounting major, single. All information confidential. Contact CHAS. J. LOVELESS PERSONNEL SERVICE, 616 S. Main, Tulsa, Oklahoma. Phone 4-3193.

NATURAL GAS AND GASOLINE SUPERVISOR

Well established, growing oil Company needs man with broad general and technical experience in the field of natural gas operations. Company operations will include handling and delivering of various types of gas on a major scale from different fields.

Applicant must be thoroughly familiar with producing, gathering, treating, dehydrating and processing techniques and economics. Must also be capable of negotiating gas sales contracts and construction contracts.

Salary commensurate with knowledge and experience.

Forward applications, giving age, education, experience, expected salary and references to Mr. J. W. McKinnon, Hudson's Bay Oil and Gas Company Limited, 534—8th Avenue West, Calgary, Alberta, Canada. Applications will be held confidential, if desired.

PETROLEUM PRODUCTION ENGINEERS

(Age 25 - 40)

Required by major oil company for career opportunities in South America.

Will have supervisory and job responsibilities related to various phases of crude production with special emphasis on work-over wells. Should be familiar with washing, swabbing, clean-out and plug-back operations. Should be thoroughly familiar with crude production and work-over equipment, gathering systems, pumps, separators, etc.; skilled in analysis of causes for deviation in well production and resourceful in recommending means for correcting difficulties. Minimum requirements: Engineering Degree from recognized institution, 5-10 years experience as Petroleum Production Engineer. Salary plus bonus—$12,000-$18,000. Also, liberal benefits, tax savings and home vacations with travel expenses. Replies confidential.

BOX 1540
Dept. Y-21
GENERAL POST OFFICE
NEW YORK 1, NEW YORK

MECHANICAL OR CIVIL ENGINEERS

Unusual Opening

Exceptional opportunity with small well established engineering firm for young mechanical or civil engineer—preferably major company or similar experience. Good educational background and 5 years or more experience with modern refinery equipment design and layout, construction and maintenance. Activities very diversified in desirable U. S. location. Some but not continuous traveling.

This position offers outstanding opportunity for ambitious and resourceful engineer who can take responsibility for the mechanical and structural aspects of our diverse activities in petroleum refining and chemical fields. Salary commensurate with ability.

BOX H-335
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA

HELP WANTED

DUE TO EXPANSION program large independent oil company has openings for assistants in seismic recording and computing. College graduates with at least one year of experience in geophysics desired. Ample opportunity for advancement. Give educational and previous employment details in initial letter and include photograph. All replies confidential. Box H-265, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERS

(Age 21-35, preferably single)

Desired by major oil company for career opportunities in South America. Work in various phases of aggressive drilling and production programs. Good opportunity for advancement. Minimum requirements: Degree in engineering from accredited institution, 0-10 years experience in petroleum engineering field. Salary plus bonus: $8,500-$14,000. Also liberal benefits, tax savings and home vacations with traveling expenses. Replies confidential.

Box 1540 Dept. Y-21
General Post Office
New York 1, New York

PETROLEUM ENGINEER
Drilling Engineer
Production and Reservoir Engineer

Positions open in Arabia. Require suitable educational background and 3 to 5 years experience. One year contract. No family quarters. Excellent salary and benefits. Apply in writing, furnishing full description of experience and qualifications to:

AMERICAN INDEPENDENT OIL CO.
111 Sutter St., San Francisco

SITUATIONS WANTED

GRADUATE PETROLEUM ENGINEER, registered professionally in Oklahoma, five years varied major company experience in drilling and production. Desire production with active independent in Rocky Mountains, Oklahoma or North Texas. Box H-313, The Oil and Gas Journal, Tulsa, Oklahoma

NATURAL GAS ENGINEER

Fifteen years' gas transmission progressive experience: Gasoline plant operation; laboratory supervision; responsible charge of plant process and mechanical design for gas processing and purification plants and compressor stations. B.S. Chem. Eng. Wish to improve present professional position. Box H-338, The Oil and Gas Journal, Tulsa, Oklahoma.

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited. Write, wire, or call collect for further information.

MAKIN DRILLING COMPANY
P. O. Box 1628, Hobbs, New Mexico,
Phone 3-3141.

146 Allen Building, Midland, Texas,
Phone 2-2962.

SITUATIONS WANTED

EXECUTIVE ENGINEER—Geologist—Age 34. Married, 10 years active, varied petroleum engineering, exploration geology, and management experience with major and substantial independent in Mid-Continent and Gulf Coast. Desires responsible position with small or medium size independent exploration and production company, having capacity for substantial growth. Box H-302, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST—seven years experience Southwest, desires location with independent company. Box H-318, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 28, family, employed 2½ years with major as reservoir engineer, last three years with independent in charge of production, costs, completion and remedial operations, desires to locate in Oklahoma or north Texas with independent. Top references. Box H-305, The Oil and Gas Journal, Tulsa, Oklahoma.

ASSISTANT GENERAL Manager-Landman desires new connection. Fifteen years experience with independents. Negotiate farmouts and trades, evaluate submittals. Fully experienced in Federal Oil & Gas. Manage office and personnel. Have accounting background familiar with tax problems, oil accounting systems, routines. Age 38. BBA degree. Box H-344, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER, registered professionally in Oklahoma, five years varied major company experience in drilling and production. Desire position with active independent in Rocky Mountains, Oklahoma or North Texas. Box H-313, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST with extensive interpretation and supervisory experience desires employment at permanent location or foreign assignment. Degrees and advanced studies in geology and engineering. Box H-293, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED PROFESSIONAL Engineer: With broad experience in all phases of oil field operations including water flooding, desires to manage operations or act as consultant. P. O. Box 9678, Dallas, Texas.

GEOLOGIST: 31, degree, single, presently employed, 6 years experience in seismic and exploitation work. Well experienced in exploitation and would prefer position in that phase with company operating in either West Texas, Oklahoma or Rocky Mountain area. Box H-329, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER available for Ark., La., Tex. area. Headquarters in Dallas. Manufacturers representative basis. Exclusive territory, specialties wanted. Oil & Gas industry as well as industrial machinery. Thirty years sales experience. Have good contacts. Dallas, Ft. Worth, Houston, Shreveport. Box H-326, The Oil and Gas Journal, Tulsa, Oklahoma.

FARM BOSS, age 40, competent, aggressive, experienced in production. Now employed but desires to make a change. Desires responsible position with chance for advancement. Prefer Southern area. Box H-320, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER, Age 37, family, 8 years experience with major company, B.S. and M.S. degrees. Now employed. Can offer experience in Frio, Wilcox, and Miolene production, log interpretation, reservoir, proration, subsurface interpretation, drilling and workover problems that will assist small company or independent in Gulf Coast Area. Box H-339, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOLOGIST, seven years experience in West Texas, New Mexico, Colorado, Nebraska and Wyoming desires position as interpreter or geophysical assistant in a permanent or semi-permanent location. Best references. Box H-332, The Oil and Gas Journal, Tulsa, Oklahoma.

GENERAL MANAGER or Field Superintendent with independent or individual. Petroleum Engineering degree, 10 years varied drilling, production and management experience. Salary or salary and interest. Box H-340, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTORNEY with 17 years diversified office experience with Major Oil Companies, desires responsible position with oil company or related industry. Experience in accounting, pipe line, insurance, right-of-way and claims and legal matters. Admitted to Bar 12 years. Married, 3 dependents. Box H-341, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

DO YOU WANT TO SELL . . .

Your **OIL PRODUCTION** on a capital gains basis? We seek to make sizable investments in sound, good quality producing properties. State full details. Confidential!

THOMAS B. LAMBERT

CONSULTING PETROLEUM ENGINEER

P. O. Box 2593 MIDLAND, TEXAS Tel.: 4-7139

SITUATIONS WANTED

ACCOUNTANT—Heavy executive experience as chief accountant in producing and drilling operations. Qualified tax man. Desires similar position with independent operator. Box H-317, The Oil and Gas Journal, Tulsa, Oklahoma.

MARRIED MAN, 2 children, age 31, now employed in Glycol Injection and Dehydration, desires to relocate with progressive oil company. Have had experience in Well completion and production. Box H-301, The Oil and Gas Journal, Tulsa, Oklahoma.

MAP STICKS

KRAFTBILT, ALL-PLASTIC SNAP-ON MAP STICKS: Light-weight resilient plastic clips snap maps to sticks in seconds—eliminate rolled map-handling problems. Bright colored Index Flags—plugged in one end of sticks, carry labeled identity and instantly "flag" the maps you want. Send for Catalog 352-A. Ross-Martin Co., P.O. Box 800-A, Tulsa, Okla.

OIL FORMS

KRAFTBILT FORMS, designed especially for the oil industry, are popular because they are efficient, economical. For all production-reporting forms, plat sheets, all administrative forms, columnar pads, truck reports, material transfer forms, ask for Catalog 854-K. Ross-Martin Co., P.O. Box 800-A, Tulsa, Okla.

LOST AND FOUND

REWARD FOR RETURN OF DIAMOND CORE BIT: Lost one 6¾ by 1¾ HH-40 Wire Line Diamond Core Bit, Serial No. UC-2 containing diamonds weighing 390.32 cts. Reward for information leading to recovery. Box H-311, The Oil and Gas Journal, Tulsa, Oklahoma.

FIRE FIGHTING SERVICE

OIL WELL FIRE FIGHTER—THE BEST
Specially Trained Under the Late Tex Thornton
TED E. FERRIN and O. E. "CHOCK" BROOME
Phone 1393-J1 or 1644-W-1, P. O. Box 642
Drumright, Oklahoma
Work in Any Field in the World

FOR SALE: Well established tank company, doing business of erection, dismantling and repairing large storage tanks. Located in Tulsa County. Write H. O. Jones, Box 2297, Tulsa, Okla.

QUALIFIED INVESTORS desired for attractive exploration program in Northern Oklahoma in semi-proven areas with successful drilling contractor and operator. References provided upon request. Box H-333, The Oil and Gas Journal, Tulsa, Oklahoma.

SANDFRAC PROSPECT

Southw. Texas. For recompletion by modern stratafrac treatment of several small pumpers on sizeable block of proven acreage with good Chalk and Buda lime saturation. Want silent or active partner with sufficient capital for reasonable development. Reliable subsurface information from own drilling available. Good chance for profitable investment. Write P.O. Drawer 791, Seguin, Texas.

ROYALTIES

87 URANIUM claims with the right count. Exploratory shaft. Will withstand rigid investigation. $50,000 for quick sale. Bryant Ferguson, 705 N. Main, Carlsbad, New Mexico.

QUOTE ME your highest price for one-half of two-thirds interest royalty out of 96.6 acres, J. C. Stewart Survey, Abstract #1880, Section 2, Block C, known as the J. W. Burnett Subdivision Estate, Young County, Texas. Lessee to pay for title check. P. O. Box 722, Clifton, Arizona.

FOR SALE: Landowners royalty on four-hundred acres in West Sage Stouctune, Big Horn County, Wyoming, one mile from production. Leased to Major Company. Box H-328, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED TO BUY Producing Royalties. Submit full particulars for our engineer's approval, including payments, plat, etc. Box 276, Rutherford, N. J.

OFFERING CHOICE PRODUCING oil income royalties with large reserves per Dollar investments. A. S. Berry, 522 Wright Bldg., Tulsa, Okla.

JACK EAGLE, Oil Properties, 706 City Nat'l Bldg., Oklahoma City, Oklahoma. Telephone REgent 6-7027.

LEASE AND DRILLING BLOCKS

SAN JUAN BASIN Southern Colorado acreage on anticline near production and geologically mapped. If you are interested in good farm-out block write or call N. O. Yeakley, 2938 Osage SW, Albuquerque, New Mexico. Phone 3-3993.

GAS COMPANY desires to purchase producing or shut-in gas properties. Also desirous of drilling proven or wildcat gas prospects. Replies confidential. Box H-310, The Oil and Gas Journal, Tulsa, Oklahoma

SEE A. L. BOWLES, Box 947, Ada, Okla., for drilling deals and producing royalties if you have the cash for Oil Investments.

125 BARRELS per day settled production in southern Oklahoma for sale to qualified investor. Option can be provided to permit engineering reports and proper evaluation. Box H-334, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW FIVE YEAR lease, excellent Pennsylvanian prospects, in active area, S/2 NW 4 Sec. 11-18N-3E, Payne County, Oklahoma. This is a good lease for only $10.00 per acre. Write or call Carl Thomas, Stillwater, Oklahoma.

WILL LEASE 112 acres Mary E. Criswell Survey, Abstract #1772, Section 2, Block C, known as the J. W. Burnett Subdivision estate, Young County, Texas. This acreage once good producer, initial production 60 barrels per hour; total depth 4,108 feet. Well completed October 2, 1943; well plugged August 21, 1944. Will lease for $10.00 per acre, one, two or three years. Lessee to pay for title check. P. O. Box 722, Clifton, Arizona.

320 ACRE Producing Oil Lease offsetting Viola and Hunton production. Strahm pool, Nemaha County, Kansas. Small Hunton well. Excellent prospects Viola. Cheap. R. D. Swan, 1006 Daniel Bldg., Tulsa, Okla.

MONTANA MINERALS FOR SALE—20 to 200 acres at $10.00 per acre. Under 1766 surface acres, leased at $1.00 rental. Carter County. Write for particulars. N. R. Brasted. 816 Sinclair Bldg., Fort Worth, Texas.

GOOD BARGAIN in override in Carter, Oklahoma field. Owner needs the money and will sell at good price for buyer. Have one tract smaller than other. Also, 200 acres near Carter shallow field for about 1600 feet. Half mile two staked wells. HURRY. Box H-342, The Oil and Gas Journal, Tulsa, Oklahoma.

400 ACRE producing Oil lease. Four wells pumping small production. Negotiation is under way for six more wells. Two for water and four for oil. These will be completed and included in the bargain price for this property. $75,000. Location Rogers County, Okla. Reason for selling Partners disagree. James E. Jenkins, Murray, Nebr.

WILL pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

SOHIO PETROLEUM Company solicits offers to buy its full working interest in the Bolton Water Flood, Montgomery County, Kansas. Bartlesville Sand produced 1906 Bbls. of oil June, 1954. Average Depth Wells —1200', 29 Producing, 43 Water Input, 33 Temporarily Abandoned, 1 Water Supply Well, Water Treating Plant, Water Distribution System, Complete Electric System, Buildings and Equipment. For inspection and complete specifications contact: Sohio Petroleum Company, 1300 Skirvin Tower Hotel, Oklahoma City. Attn.: J. R. Wilson, Jr. Phone REgent 9-0511.

WANTED: Major company wants to acquire oil producing property for experimental purposes. Must be producing from closed sandstone reservoir. Prefer depth less than 1500 feet, at least 10 feet of clean sand, and productive area less than 200 surface acres. Submit details to Box H-343, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

BUSINESS SERVICE

Delaware Corporations formed and serviced, American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware

REAL ESTATE

OFFICE SPACE FOR LEASE

Downtown Oklahoma City. Up to 5,000 sq. ft. Air conditioned, redecorated, adjacent parking. Reasonable rate. All or part to suit tenant.

Box H-336, The Oil and Gas Journal, Tulsa, Oklahoma.

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LEGAL

NOTICE OF OIL AND GAS LEASE SALE
Under Sealed Bid on August 24, 1954
FORT BERTHOLD INDIAN AGENCY
New Town, North Dakota

Sealed bids for Oil and Gas Mining Leases on restricted Allotted lands of the Fort Berthold Indian Reservation, North Dakota will be received at the Office of the Superintendent of said reservation, New Town, North Dakota until 2:00 P. M., Central Standard Time on August 24, 1954, and will be opened immediately thereafter in the presence of such bidders as may attend. The total allotted land covered by the advertisement is 22,419.80 acres. All of this land is located in Dunn County, State of North Dakota. For additional information write the superintendent of the Fort Berthold Agency, New Town, North Dakota, or call the Agency Land Office, phone 74340, New Town.

Ralph M. Shane
Superintendent

Dated July 24, 1954

HERE'S HOW YOU SAVE WITH FORD *TRIPLE* ECONOMY

New Series T-800 tandem axle trucks are Ford factory-built for low first cost. Up to 40,000 lbs. GVW, 60,000 lbs. GCW. New LOW-FRICTION 170-h.p. *Cargo King* V-8. Power Steering included as standard equipment.

Make Courtesy your Code of the Road!

You get more of the features you need most in a New FORD *TRIPLE ECONOMY* TRUCK!

Here's proof. Your Ford Dealer can give you plenty more!

(Or write Ford Division, Ford Motor Co., Dept. T-20, Box 658, Dearborn, Mich.)

FEATURE	FORD T-800 TANDEM	TRUCK I TANDEM	TRUCK G TANDEM	HOW YOU BENEFIT
Engine				
Displacement, cu. in.	317	406	426	**Greater concentration of power!** Ford offers more horsepower per cubic inch of displacement. Smaller displacement usually means less gas.
Horsepower per cu. in.	0.536	0.379	0.415	
Piston Stroke (in.)	3.50	4.50	5.00	**The slower piston speeds** of Ford's Short Stroke design cut piston travel, reduce wear, increase engine life.
Piston Speed ft. per min. (at 3000 rpm)	1750	2250	2500	
Free-turn Intake and Exhaust Valves with Integral Guides	Yes	No	No	**Free-turn valves with integral valve guides** let valves run cooler, last up to 50% longer!
Cab & Controls				**Only Ford** offers Power Steering as standard equipment. Cuts steering effort as much as 75%.
Power Steering Standard	Yes	No	No	
Glass Area (sq. in.)—				**Ford's "visibility unlimited"** means greater truck-driving safety, ease and comfort for the driver.
Windshield	938	841	735	
Total Std. Cab.	2103	1705	1709	**Only Ford** has these two driver-saving features—seat shock snubbers and woven plastic upholstery—that are tops for a smoother, cooler, more comfortable ride.
Seat Shock Snubbers	Yes	No	No	
Woven Plastic Upholstery	Yes	No	No	
Chassis				**Money-saving,** trip-saving capacities are an important feature of all Ford **Triple Economy** Trucks.
GVW Rating (lbs.)	40,000	38,000	39,000	
Payload-Body Capacity (lbs.)	29,943	26,067	26,735	**Ford's front axle** capacity exceeds all other makes by as much as 2000 lbs. for greater dependability, safety.
Front Axle Capacity (lbs.)	9,000	7,000	8,000	
Total Rear Spring Capacity (lbs.)	31,100	30,940	26,000	**Greater spring capacity** is another example of Ford's sturdier construction for bigger payloads, longer life.

All chart information is based on latest data available as of 6-30-54 and is believed to be reliable but is not guaranteed.

NEW PACKER HELPS SET RECORD FOR PERFECT RUNS

Steel supports 40.6 sq. inches of the Packer and transmits load to the Anchor.
9.0" Hole
Expanding Shoe supports 13.3 sq. inches of the Packer.
Packer and Shoe compressed—full mud column on Packers.

ADDS MUCH TO SUCCESS OF

HALLIBURTON'S

HYDRO-SPRING TESTER

This new Expanding Shoe Packer has a hard rubber shoe with a steel sole that prevents packer from extruding beyond its working limits. The shoe decreases drag going in hole, minimizes pulling and jarring to release packer, returns to shape readily, and comes out of hole intact with little or no rubber to be drilled out.

These big new benefits add much to the phenomenal success of Halliburton's Hydro-Spring Tester, the most mechanically-perfect testing tool ever developed. In two years of use on some 20,000 jobs, you can count on your fingers the times it has failed. No other tool has equalled that record. And, when the string is back on the walk, you've got a pressure recording from the Bourdon Tube that is the most accurate and complete record available.

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Hydro-Spring Tester—Patent Applied For

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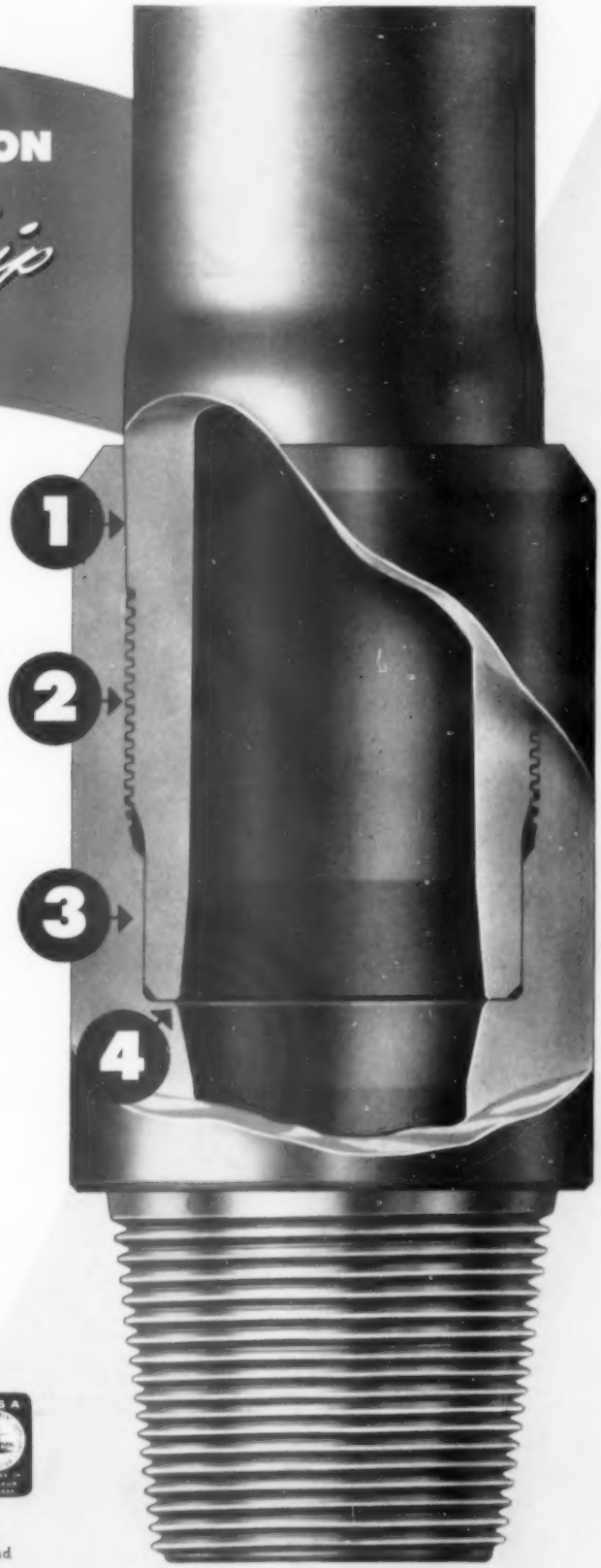
Straight Grip
TOOL JOINTS



—FAMOUS FOR 4-POINT SEAL PROTECTION!

1. Stabilizer Fluid Seal
2. Thread Tension Seal
3. Inside Fluid Seal
4. Shoulder Fluid Seal

Use Straight Grip
for positive protection against joint leakage and creep!

Use Straight Grip
for a tighter seal as pump pressures and tension loads increase!

Use Straight Grip
for replacement ease because worn joints can be removed and replaced with new, right at your rig!

Use Straight Grip
for trouble free drilling because of the four points of seal!

AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF A OIL FIELD EQUIPMENT
OKLAHOMA CITY U.S.A.
REG. U.S. PAT. OFF.

PESA

Also manufacturers of "Flash Welded" (welded on) and "Amweld" (counterbore weld) Tool Joints